

CHAPTER 3—AFFECTED ENVIRONMENT

3.1 INTRODUCTION

This chapter describes the existing resource conditions, resource uses, special designations, and socioeconomic conditions of the Price Field Office (PFO). The affected environment serves as the baseline of existing conditions from which the impacts of the alternatives are analyzed.

3.1.1 Overview of the Planning Area

The PFO encompasses approximately 2.5 million acres within Carbon and Emery counties, which are located in central-eastern Utah. The Green River on the east, the Manti-LaSal National Forest on the west, and the Carbon-Duchesne county line on the north bound the PFO. Capital Reef and Canyonlands National Parks and Bureau of Land Management (BLM) lands border the south (Map 1-2 of Chapter 1). Interstate 70 (I-70) traverses the southern half of the PFO. State highways U-10 and U-6 are located within the Field Office.

A number of noted features are located within the area, including the Book Cliffs, Roan Cliffs, San Rafael Swell, Nine Mile Canyon, Desolation Canyon, Cleveland-Lloyd Dinosaur Quarry, and Price River Canyon. Based on the modified Köppen Classification System (1987a), the Wasatch Plateau and Book Cliffs of the PFO are characterized as undifferentiated highlands, the central and northern portions of the PFO have steppe climates, and the southeast portion of the PFO has a desert climate.

Elevations in the PFO range from about 4,000 feet at the city of Green River to more than 10,000 feet at Bruin Point. The majority of the PFO is drained by the Green River, including discharges from the Price River and San Rafael River. The Green River eventually drains into the Colorado River south of the PFO in Canyonlands National Park. Muddy Creek discharges south into the Dirty Devil River, which joins the Colorado River in Canyonlands National Park. A small portion of the PFO drains to the Great Salt Lake via Soldier Creek and Utah Lake.

3.1.1.1 Physiography and Geology

The PFO lies within the Colorado Plateau physiographic province (Map 3-1). In 1928, Fenneman subdivided the Colorado Plateau into six sections on the basis of observable geomorphic features (Fenneman, 1928). The majority of the PFO lies within the Canyon Lands section of the Colorado Plateau, while the northern half of Carbon County is in the Uinta Basin section, and the western edge of both Carbon and Emery counties are included in the High Plateau section. More recently, Stokes (1986) refined the physiographic sections within the State of Utah for the Colorado Plateau, Rocky Mountain, and Basin and Range Provinces. Carbon and Emery counties include four sections within the Colorado Plateau (the Book Cliffs/Roan Plateau, Mancos Shale Lowlands, San Rafael Swell, and Green River Desert), and one physiographic section that is considered transitional between the Colorado Plateau and Basin and Range (the Wasatch Plateau section). In addition, a very small section of the Circle Cliffs-Teasdale Anticline Section of the Colorado Plateau cuts the extreme southwest corner of the PFO.

Perhaps the dominant physical feature within the PFO is the San Rafael Swell occupying the majority of Emery County. This feature is a large northeast trending upwarp approximately 75 miles long and 30 miles wide that is part of a much larger, double-plunging anticline (e.g., dome) structure. This large, regional fold exposes rocks of Pennsylvanian through Cretaceous age (Maps 3-1 through 3-3). Resistant beds of sandstone are exposed as hogbacks on the steeply upturned east and west flanks of the anticline

and are referred to locally as “reefs.” Three perennial rivers (the Muddy, San Rafael, and Price) flow eastward across the San Rafael Swell into the Green and Colorado River system (Map 1-1 of Chapter 1).

Bordering the San Rafael Swell on the north, west, and northeast sides is the Mancos Shale Lowland section, including Castle Valley, Clark Valley, and Grand Valley. The Upper Cretaceous Mancos Shale is an easily eroded rock formation and is exposed at the surface across much of this section, resulting in relatively low-lying areas. The landscape of the Mancos Lowlands is characterized by sloping, gravel-covered pediments, rugged badlands, and flat bottom alluvial valleys (Stokes, 1988). Immediately southeast of the San Rafael Swell lies the Green River Desert Section of the Colorado Plateau characterized by Quaternary eolian deposits (Maps 3-2 and 3-3) with scattered mesas and buttes of Jurassic bedrock exposed at the surface.

To the north of the Mancos Shale Lowlands lies the Book Cliffs and Roan Plateau section of the Colorado Plateau. This area constitutes the southern extension of the Uinta Basin where Upper Cretaceous and Lower Tertiary rocks (Maps 3-2 and 3-3) rise upward from the north along the dip slopes of the basin to reach elevations of 8,000 to 10,000 feet. On their south end, these rocks are abruptly truncated in great erosional cliffs that descend to elevations around 5,000 feet in the Mancos Lowlands. The Book Cliffs are formed by Upper Cretaceous sandstones and shaly siltstones of the Mesaverde Group, including Blackhawk Formation, Castlegate Sandstone, and the Price River Formation. To the northeast of the Book Cliffs, the Roan Cliffs are formed by the reddish-brown mudstone and sandstone beds of the Colton Formation (Paleocene-Eocene) (Maps 3-2 and 3-3). Further to the northeast in Carbon County are other erosional rises including the West Tavaputs Plateau and the Bad Land Cliffs that expose the Eocene Green River Formation.

Along the west margin of the PFO is the Wasatch Plateau section transitioning between the Colorado Plateau and Basin and Range physiographic provinces (Stokes, 1986). The area displays some features typical of the Great Basin, such as extensional tectonics and north-south trending normal faults. The steep eastern margin of the Wasatch Plateau is a continuation of the Book Cliffs escarpment and is an erosional feature not related to faulting (Stokes, 1986).

The Circle Cliffs-Teasdale Anticline physiographic section lies in the extreme southwest corner of Emery County (Map 3-2). This anticlinal structure is similar to the San Rafael Swell but shorter and narrower, and its axis trends northwest (Stokes, 1986).

3.1.1.2 Climate

The proximity of the Wasatch Mountains exerts a strong influence on the climatology and meteorology of the area. Areas east of the Wasatch Range are characterized by hot, dry summers, and cold, dry winters. Air movement at this latitude is predominately from the west and northwest, year round, with periodic air movement from the southeast during late summer.

The lower elevations receive less than 10 inches of precipitation annually. Higher elevations of the PFO receive approximately 12 to 30 inches of precipitation annually. Snow amounts also are low east of the Wasatch Mountains. Average maximum temperatures in the area range from 97°F in July to 33°F in January. Average minimum temperatures range from 7°F in January to 58°F in July.

3.2 RESOURCES

3.2.1 Air Quality

This section describes the air resource within the PFO. The *Air Quality Baseline and Analysis Report* (2003), prepared in conjunction with this Resource Management Plan (RMP), provides a detailed description of the air quality conditions, contributors to measurable degradation, and analysis for resource management relative to air quality standards.

3.2.1.1 Ambient Air Quality Standards

The Utah Division of Environmental Quality (UDEQ) is responsible for monitoring air quality. On the basis of measured data, the region's remoteness, and a lack of major urban communities, Carbon and Emery counties are designated as "attainment" or "unclassifiable" with respect to National Ambient Air Quality Standards (NAAQS) (40 Code of Federal Regulations [CFR] Part 81.345). The air quality in the PFO has never been designated as "non-attainment" for any criteria pollutant.

3.2.1.2 Existing Air Quality

Under criteria established through the Clean Air Act, as amended in 1990, the PFO has been designated as a Class II airshed, which means that air quality has not exceeded NAAQS. Mandatory Class I designations exist for all National Parks and Wilderness Areas. Near or adjacent to the PFO are three National Parks with Class I designations (Arches, Canyonlands, and Capital Reef National Parks). Standard Visual Range in the Class I airsheds is measured over 40 miles. The Standard Visual Range in the PFO is estimated to be reduced by 10 percent on two or fewer days in a year (BLM, 1999b). BLM recognizes a reduction of 10 percent in Standard Visual Range as barely discernible to the public.

3.2.1.3 Sources of Air Pollution

The Carbon Power Plant, Sunnyside Cogeneration Plant, Hunter Power Plant, and Huntington Power Plant are major sources of air pollution in Carbon and Emery counties. The greatest amounts of air pollution emissions in the PFO result from those major sources, which are located in Carbon and Emery counties. Primary pollutants in Carbon County are carbon monoxide (CO), sulfur dioxide (SO₂), nitrogen oxides (NO_x), and particulate matter less than 10 microns in diameter (PM₁₀). NO_x is the primary pollutant in Emery County followed by SO₂, CO, and PM₁₀. Area sources account for the most emissions in Carbon County, whereas point sources account for the most emissions in Emery County (UDAQ, 1996). Pollutants of interest resulting from BLM activities in the PFO are NO₂, SO₂, CO, and PM₁₀. However, none of the major sources of these pollutants are managed by BLM.

Air quality in the PFO could be affected by emissions from construction equipment, gaseous emissions from the operation of natural gas-fired compressors and glycol dehydration units at compressor facilities, occasional flaring of natural gas at well sites, suspended PM₁₀ generated by construction activities, motorized vehicles traveling on access roads, off-highway vehicles (OHV), and wind-blown dust over exposed areas.

3.2.2 Soil, Water, and Riparian

3.2.2.1 Soil

Seventy-one general soil types were delineated within the PFO. These soils have developed on nine major landforms: valley floors, alluvial fans, fan terraces, shale hills, outwash plains, benches, mountain

slopes, canyon sides, and plateaus. General and detailed soil information was obtained in a review of the Soil Survey of Carbon-Emery Area, Utah (SCS, 1970) and the Soil Survey of Carbon Area, Utah (SCS, 1988). There are no prime or unique farmlands in the PFO.

Erosion

Some areas in the PFO have a high potential of contributing salt and sediment to drainages, high susceptibility to water or wind erosion when disturbed, and high runoff potential. These areas are further discussed below.

Water Erosion

Water erosion is a function of rainfall, soil erodibility, length of slope, percent of slope, vegetation cover, soil conditions, and management practices. Bank erosion is accelerated in stream channels as a result of damming practices, improperly functioning riparian systems, and hydrologically unstable streams. Water erosion is also accelerated by continuous flowpaths formed by roads, railroads, paths, and trails, and by the change in flow regime from sheet flow to channel flow caused by roads, railroads, paths, and trails.

Soils with slopes of less than 2 percent have a slight water erosion hazard, soils with slopes of 2 to 15 percent have a moderate water erosion hazard, and slopes greater than 15 percent have a high water erosion hazard (NRCS, 2001). Soils with surface textures that are highly susceptible to water erosion generally have a high proportion of coarse to very fine sands, or silts with little binding material such as clay or organic matter. Loams and silty clay loams intermixed with barren shale, rubbleland, or rock outcrop are found widely distributed throughout the PFO. When the vegetation or biologic crust on these soils is removed, such as by surface disturbance, fire, or heavy grazing pressure, the soils are subject to erosion. Under good vegetation cover, soil loss is less than 1 ton per acre per year; with poor cover, soil loss can exceed 5 tons per acre per year. When these soils are disturbed, 10 tons per acre per year could be lost (BLM, 1991a; NRCS, 2001; SCS, 1970; SCS, 1988).

Intense, often localized, convective storms from mid-summer to early fall can flashflood dry washes and small streams. This occurs most often in areas with high runoff potential, including extensive rock outcrop and badlands. These soils have a very slow infiltration rate when thoroughly wet. The major stream channels throughout the PFO are also subject to flooding from spring snowmelt at higher elevations. Soils are also subject to flooding along floodplains of major stream channels (BLM, 1991a).

Wind Erosion

Wind erosion is a function of soil erodibility, roughness, climate, length of slope, vegetation cover, presence of physical or biological crusts, and soil condition. Soil erodibility by wind is directly related to the percentage of dry, non-erodible soil aggregates greater than 0.84 millimeters in equivalent diameter. The soil erodibility is expressed in terms of soil loss in tons per acre per year (NRCS, 2001). Wind erosion is a critical issue following the removal of protective vegetation and is most likely to occur in areas of arid climates such as those at lower elevations of the PFO. When the vegetative cover or biological crust is removed, soils high in fine-textured material are easily transported by wind. This results in the displacement or loss of topsoil, increased sedimentation, and impacts to ambient air quality from elevated dust levels. Mancos shale areas tend to be particularly susceptible to wind erosion.

The soil surveys indicate that the soil series in the northern portion of the PFO have a low to moderate potential for wind erosion. Soils in the southern portion of the PFO are highly susceptible to wind erosion. These soils have a very high proportion of medium, fine, and very fine sands, and no binder of clay or organic matter is present in any quantity. These soils are susceptible to either surface disturbance

or periods of prolonged drought. The major impact from wind erosion is damage to or loss of structures such as fences, cattle guards, roads, and reservoirs (BLM, 1997; SCS, 1970; SCS, 1988).

Salinity

Salt and sediment yield is of major concern in the Colorado River Basin, and erosion on public lands is an important source of sediment and associated salts in the PFO. Some of this is natural or resulting from relatively stable conditions in a semiarid or arid climate regime with periodic high-intensity storms. Of the salt contributed from public lands, the majority is presumed to come from surface or near-surface transport of salt from saline geologic formations and saline soils. Saline geologic formations and slightly to highly saline soils are extensive in the PFO. Major salt-bearing formations in the PFO include the Summerville, Moenkopi, Carmel, Curtis, Morrison, Cedar Mountain, and Mancos (BLM, 1991a).

Badlands and gypsumlands are natural sources of sediment and salt. These areas lack vegetation, but they frequently have a thin mantle of hard shale or rock fragments or cryptogamic cover, which provides some stability and helps prevent surface erosion. Badlands occur mainly on exposures of the Morrison, Cedar Mountain, and Mancos Formations, whereas gypsumlands occur mainly on exposures of the Carmel and Summerville Formations. Present losses of sediment from badlands and gypsumlands are estimated at 5 to 50 tons per acre per year. These highly dissected areas, with their steep slopes and intricate drainage patterns, are little used by livestock because of the lack of forage and the complex terrain. They are, however, used by wild horses and burros and big game species (bighorn sheep, deer, and elk). Surface disturbance in these areas could increase the loss rates to 10 to 75 tons per acre per year (BLM, 1991a).

The main areas containing gypsumlands and gypsiferous soils are on the west flank of the San Rafael Swell to the Coal Cliffs and Molen Reef, and southeast of San Rafael Reef near Goblin Valley. Gypsumlands and gypsiferous soils occur with more stable soils but in delineated areas, which make up more than half the area (BLM, 1991a).

Although they can inhibit vegetation growth, salts that are held deeper in the soil profile are generally not a major source of salinity to the Colorado River system, except along drainages where bank erosion or subsurface leaching occurs. However, several plants in the PFO (mat, saltbrush, halogeton, wedgeleaf, saltbrush, salt cedar, shadscale, greasewood, and fourwing saltbush) concentrate salts in their tissues. The salts are available for transport to the drainage system in plant litter.

Soils rated very high in salinity (greater than 16 mmhos/cm) are found mostly in eastern Emery County, with a few small areas scattered throughout eastern Carbon County (BLM, 1997). Soils rated moderately to high in salinity (4–16 mmhos/cm) occupy mostly the eastern half of the PFO (BLM, 1997). Soils rated low in salinity (less than 2 mmhos/cm) are primarily found on the western half of the PFO at higher elevations (BLM, 1997).

3.2.2.2 Water

Watersheds

The PFO lies within portions of seven major watersheds (4th Level Hydrologic Units) located in the Upper Colorado Hydrologic Region (Region 14) (see Table 3-1). The majority of the PFO is contained within the West Colorado River Watershed, although portions are in the Uinta Basin Watershed (UDWQ, 2002).

Table 3-1. Price Field Office Watersheds

8-Digit Hydrologic Unit Code	Watershed Name	Total Watershed Acres	BLM Acres Within PFO	Percentage of Watershed on BLM Land in PFO
14060005	Argyle Creek	49,528	232	0
	Minnie Maude	62,813	14,358	23
	Nine Mile	122,214	42,298	35
	Flat Canyon Creek	29,401	13,780	47
	Rock Creek	34,937	19,762	57
	Upper Range Creek	43,687	25,242	58
	Stone Cabin Draw	11,867	7,704	65
	Dry Canyon	25,912	18,388	71
	Cottonwood Canyon	20,509	14,677	72
	Lower Range Creek	49,770	42,341	85
	Jack Creek	31,014	26,430	85
	Green River Sub 1	16,369	15,716	96
	Green River Sub 2	12,726	12,655	99
	Green River Sub 3	11,867	10,948	92
	Green River Sub 4	20,563	16,880	82
	Green River Sub 5	4,592	4,464	97
	Green River Sub 6	20,470	19,027	93
	Green River Sub 7	17,402	16,126	93
14060007	Schofield	94,149	81	0
	Price River Upper	86,983	18,936	22
	Price River Middle	197,721	162,671	82
	Price River Lower	100,909	87,864	87
	Price River Municipal	103,353	37,846	37
	Gordon Creek	58,191	13,637	23
	Miller Creek	51,829	18,437	36
	Soldier Creek	33,729	14,256	42
	Coal Creek	40,750	17,600	43
	Desert Lakes	42,991	9,777	23
	Olsen Reservoir	52,483	26,772	51
	Icelander Creek	51,035	26,837	53
	Grassy Trail Creek	139,351	81,824	59
	Desert Seep Wash	36,636	24,988	68
	Consumers Wash	8,505	4,775	56
	White River	62,940	0	0
14060008	Barrier Creek	88,976	12,667	14
	Green River Sub 8	257,645	195,099	76
	Green River Sub 9	3,246	2,422	75
	Green River Sub 10	11,112	9,586	86
	Green River Sub 11	6,920	6,794	98
	Green River Sub 12	8,123	7,729	95
	Keg Spring	14,331	13,121	92
	Three Canyon	6,596	6,190	94
14060009	Cottonwood Creek	210,230	33,999	16
	Ferron Creek	156,141	28,840	18
	Huntington Creek	218,179	51,051	23
	Buckhorn Wash	64,417	47,376	74
	North Salt Wash	154,921	128,657	83
	San Rafael River	724,533	612,527	85
14070002	Muddy Creek	966,751	487,513	50
14070004	Dirty Devil Partial	19,910	18,159	91
16020202	Davidson Canyon Partial	1,119	0	0

Source: BLM.

BLM manages surface or mineral estate within portions of most municipal watersheds in the PFO. Runoff from public lands in or adjacent to these watersheds could affect water quality.

Critical Watersheds

Critical watershed areas include soils that have a high potential for salt yield, are subject to severe water and wind erosion when disturbed, have high runoff potential during storm events, are subject to frequent flooding, and have a potential for loss of vegetation productivity under high rates of wind or water erosion. Activity plans were written for Muddy Creek, Cottonwood Creek, and Ferron Creek watersheds.

Surface Water

The Green River (Hydrologic Unit Code [HUC] 14060008) and two of its major tributaries, the Price River (HUC 14060007) and San Rafael River (HUC 14060009), are the major basins in the PFO. See Table 3.1 for further information. The PFO also includes portions of Nine Mile Creek (HUC 14060005) and Dirty Devil River (HUC 14070002). Included in the mentioned basins are several perennial stream channels including Muddy Creek, Huntington Creek, Ferron Creek, Cottonwood Creek, and Range Creek. Numerous smaller perennial, intermittent, or ephemeral stream channels with an array of flow regimes and uses are located throughout the PFO with smaller segments located near springs or headwaters having perennial flow.

Lakes and reservoirs in the PFO include Millsite Reservoir, Olsen Reservoir, and Huntington Lake North. BLM manages approximately 1,200 stock watering reservoirs, most of which are filled with run-off via ephemeral channels. No substantial reservoirs are currently under development, nor are any proposed.

Surface Water Quality

BLM monitoring of Green River tributaries in Desolation Canyon has shown an increase in fecal coliform bacteria when the streams are grazed by cattle. In some cases, Clean Water Act (CWA) Standard for primary and secondary contact (swimming, wading, boating, fishing) has been violated. Fecal coliform to fecal streptococcus ratios indicate cattle as being the most likely source of this pollution. Increased fecal coliform in waters with high recreation use increases the risk of fecal-borne pathogens infecting humans.

The Green River is the largest riparian system in the field office area. Over the past 20 years, cattle use in Desolation Canyon has declined to non-use. Over this period with cattle removed, the green line aspect has changed from tamarisk to willow and riparian conditions along the river and tributaries have improved greatly. When cattle were using the area, cottonwood reproduction was not occurring and all trees were mature or over-mature. Cottonwood reproduction now occurs regularly and all age classes of cottonwood are found. Rock Creek, a major tributary, is the most intensely monitored and has gone from a non-functioning to a functioning condition. It previously had bare banks but now is a wide, ditch-like stream that is well vegetated with willow.

Water Rights

All surface water available for irrigation and industry has been appropriated. When those waters have been developed, there can be no more development unless it is for 0.015 cubic feet/second (cfs), which can be approved only for domestic water for one family, stock watering, or irrigation for 0.25 acres of land or less. Water rights can still be obtained for stock ponds less than 3 acre-feet. Temporary water rights, usually used during drilling operations or road dust control, are still available. These rights are issued for a maximum of 7 years for about 3 acre-feet and are issued only if they do not interfere with any other uses (BLM, 1991a).

Water Developments

BLM surface water developments have included stock ponds, erosion control structures, rainfall catchments, spring developments, off-channel reservoirs, flow diversions, and guzzlers. Stock ponds and wildlife guzzlers will continue to be developed. Management objectives have been to provide water for the complete and appropriate use of wildlife and livestock forage, to protect and enhance watershed conditions where they were being degraded, and to restore or enhance riparian areas.

Irrigation

The majority of surface water in the region is appropriated for irrigation. Irrigation practices often involve dams that divert all flow within a stream, which has a significant detrimental effect on BLM stream channels and riparian habitat. Water is diverted from Huntington Creek, Cottonwood Creek, Ferron Creek, Muddy Creek, Price River, San Rafael River, Green River, Nine Mile Creek, Range Creek and other small drainages. As a result, the water during summer consists mainly of irrigation return flow that is slightly to moderately saline (BLM, 1991a).

Industrial Water Use

Industrial water use in the PFO is chiefly for the generation of electricity. Utah Power and Light operates the Huntington, Hunter, and Price Canyon power plants. These plants use water from Huntington Creek, Price River, and Trail Springs Wash (BLM, 1991a). Coal mines also use surface water in hydraulic and cooling systems on mining machinery. Incidental drilling operations temporarily use local water sources. Any proposed new uses would have to acquire water within existing allocations.

Groundwater

The PFO is nearly all underlain by a series of consolidated sedimentary formations. All the geologic units contain some water, but only five are considered to be major aquifers: Entrada, Navajo, and Wingate Sandstones, the Coconino Sandstone (including its equivalents in the Cutler Formation), and rocks of the Mississippian age. Several other formations are at least locally important, including the Carmel Formation, the Salt Wash Sandstone member of the Morrison Formation, the Curtis Formation, and the Moss Back Member of the Chinle Formation (BLM, 1991a). The formations are encountered at depths ranging from surface outcrops to more than 2,000 feet.

Groundwater supplies are controlled more by recharge conditions than by use depletions. Precipitation is the ultimate recharge source. Areas with exposed permeable formations, where average annual precipitation is more than 12 inches, usually are recharge areas (BLM, 1991a). Groundwater moves from these areas of recharge, discharges to stream valleys flowing from the Wasatch Plateau and Bookcliffs and recharges the major aquifers underlying the PFO.

Groundwater is a part of the developed water supply for municipalities in the PFO. Price City, Helper, Wellington, and East Carbon all use groundwater for portions of their municipal water supplies. BLM also manages wells scattered throughout the PFO, which tap water from perched aquifers. There are numerous private domestic wells within region. There is also a usable confined aquifer that tops at 100 feet below the surface in Nine Mile Valley.

Groundwater disposal is a significant aspect of coal bed methane (CBM) development. The discharge of saline water during gas production poses strategic problems for water and watershed management in the PFO.

Water Quality

Surface Water Quality. On public lands in the Colorado River basin, the primary factors affecting water quality are runoff events containing appreciable sediments and salts. Runoff from public lands tends to accumulate salts and sediment from surface soils and from saline soils in drainages and transport them into the main drainages during intense localized storms. Runoff adds to the salt content of the irrigation return flow carried by the Price River, San Rafael River, Green River, Nine Mile Creek, Range Creek, Rock Creek, and Muddy Creek. Minor segments of perennial streams (generally those near the U.S. Forest Service [USFS] boundary, where most diversions for irrigation and municipal uses are located) have low salt content and sediment loads. Reduction or elimination of surface cover tends to increase runoff, resulting in increased erosion and a greater amount of sediment and salt carried into the drainage channels. When the amount of runoff increases, discharges into streams tend to be greater and of shorter duration, increasing channel cutting and sometimes flooding. Several agencies, including the U.S. Geological Survey (USGS) and the State of Utah, have established a gauging network on the San Rafael River and Muddy Creek and their major tributaries, to monitor salt content and compliance with water quality standards on major stream segments.

Water quality comprises the measured physical, chemical, and biological characteristics of the streams in the area. The target parameters are set by the state and federal regulations for particular stream segments or particular water uses. Surface water quality in most of the PFO has high total dissolved solid (TDS) levels and heavy sediment loads (BLM, 1989b). State water quality standards have been exceeded at several stations (BLM, 1991a). Pursuant to Section 303(d) of the CWA as amended, each state is required to identify those water bodies for which existing pollution controls are not stringent enough to implement state water quality standards. Thus, those water bodies not currently achieving or not expected to achieve those standards are identified as “water quality limited.” A water body can be water quality limited because of point or non-point sources of pollution, or both. In addition to common sources of pollutants, there can be pollutants resulting from habitat alterations (e.g., riparian habitat loss) or hydrological modifications (UDWQ, 2002).

A full list of streams and water bodies located in the PFO and shown on Utah’s 2002, 303(d) list appears in Tables 3-2 and 3-3. Water bodies with permit renewals dated from April 1, 2002, to March 31, 2004, were listed for pollutants that are not controlled through technology-based requirements or end-of-pipe requirements. With few exceptions, stream water bodies assessed as “partially supporting” or “not supporting” their beneficial uses were listed. In addition, waterbodies for which a total maximum daily load (TMDL) has been completed and approved by the Environmental Protection Agency (EPA) were not listed (UDWQ, 2002).

Table 3-2. Utah’s 2002 303(d) List

Waterbody Name	Waterbody Description	HUC Unit	Cause
Nine Mile Creek	Nine Mile Creek and tributaries from confluence with Green River to headwaters	14060005	Temperature
Gordon Creek	Gordon Creek from confluence with Price River to headwaters	14060007	Total Dissolved Solids
Price River 3	Price River and tributaries from Coal Creek confluence to Carbon Canal Diversion	14060007	Total Dissolved Solids
Lower Grassy Trail Creek	Grassy Trail Creek tributaries from confluence with Price River to Grassy Trail Reservoir	14060007	PH
Price River 4	Price River and tributaries from near Woodside to Soldier Creek confluence	14060007	Total Dissolved Solids
Price River 5	Price River and tributaries from confluence with Green River to near Woodside	14060007	Dissolved Oxygen, Iron, Total Dissolved Solids

Waterbody Name	Waterbody Description	HUC Unit	Cause
Huntington Creek 4	Huntington Creek tributaries from confluence with Cottonwood Creek to Highway 10 Crossing	14060009	Total Dissolved Solids
Lower Cottonwood Creek	Cottonwood Creek from confluence with Huntington Creek to Highway 57	14060009	Total Dissolved Solids
Upper San Rafael	San Rafael River from Buckhorn Crossing to confluence with Huntington and Cottonwood Creeks	14060009	Total Dissolved Solids
Lower San Rafael	San Rafael River from confluence with Green River to Buckhorn Crossing	14060009	Total Dissolved Solids
Middle Muddy	Muddy Creek and tributaries from Quitchipah Creek confluence to U-10 Crossing	14070002	Total Dissolved Solids
Lower Muddy Creek	Muddy Creek from confluence with Fremont River to Quitchipah Creek confluence	14070002	Total Dissolved Solids

Source: UDWQ, 2002.

Table 3-3. Waterbodies and Specific Parameters to Be Removed From Utah's 2000 303(d) List

Waterbody Name	Waterbody ID	Parameter	Justification
Scofield Reservoir	UT-L-14060007-0005	Total Phosphorus	TMDL Approved—2000
Scofield Reservoir	UT-L-14060007-0005	Dissolved Oxygen	TMDL Approved—2000

Source: UDWQ, 2002.

Groundwater Quality. Groundwater quality is highly variable, depending on the formation in which the aquifer is located and on the well location. Groundwater contamination is a continuing concern. Fresh water in the Navajo Formation is contaminated with high levels of TDS where this formation is exposed in alluvium next to the San Rafael River and Muddy Creek. Mineral exploration and development activities have the potential to contaminate this and other fresh-water aquifers (BLM, 1991a).

Flood Hazards

The watersheds upstream of existing towns in the PFO are in mixed ownership of federal, state, and private land. Most public land is on steep terrain with clayey, stony, and shallow soils. These areas have high runoff potential, and surface-disturbing activities can change the duration and peaks of runoff events reaching the streams. Debris jams and channel bank erosion on these lands can cause flooding and sediment damage to private agricultural land, irrigation works, buildings, roads, and other structures. The structures most often affected by peak runoff events on public lands are water and erosion control structures, stock ponds, and roads, which often follow canyon floors and cross-stream channels.

Actions likely to affect runoff events or stream flow are large-scale surface disturbance from mining or other activities. Development of roads and trails tends to increase the effective drainage network, by concentrating water flow and providing direct linkages of uplands to drainages. These actions could substantially increase runoff into local streams, and removal or destruction of riparian vegetation along existing stream segments in public ownership, which could change channel characteristics and peak discharge rates (BLM, 1991a).

Floodplains are not extensive in the PFO, even considering dry washes. About 55,000 acres are recognized as occurring in floodplains subject to 100-year floods. Smaller washes can be expected to be flooded during any intense local storms (BLM, 1991a).

3.2.2.3 Riparian and Wetlands

Riparian areas are areas with distinctive soils and vegetation between a stream or other body of water and the adjacent upland. It includes wetlands and those portions of floodplains and valley bottoms that support riparian vegetation. The riparian ecosystem is considered valuable for providing wildlife and fisheries habitat, maintaining water quality, stabilizing stream banks, and providing flood control and scenic and aesthetic values. Lake shores (lentic ecosystem) and stream banks (lotic ecosystems) are typical riparian areas. Riparian areas do not include ephemeral streams or washes without the vegetation that depends on free water in the soil (UDWR, 1999). Map 3-4 depicts riparian habitats in the PFO.

Wetlands are those areas that are inundated or saturated with water at or near the surface of the soil for a sufficient duration during the growing season to develop characteristic soils and vegetation (ACOE, 1987). Many special status species depend entirely or partially on wetland areas (EPA, 1995). Wetlands are protected under CWA as “special aquatic sites.”

All riparian areas in PFO are considered sensitive and important (unique/limited) habitats that provide critical vegetation and transportation corridors for mammals, birds, and amphibians. Some of the larger riparian areas include the Green River, San Rafael River, Price River, Nine Mile Creek, Rock Creek, Gordon Creek, Range Creek, and Muddy Creek. All riparian systems within the PFO are also important components of hydrologic function. The hydrologic network that feeds and supports these eight major watercourses also provides riparian areas that support species life-history needs. BLM uses the concept of proper functioning condition (PFC) to delineate riparian habitat quality and to assist in guiding management actions. The condition of riparian habitat and the percent of PFO riparian areas in each functioning condition category are shown in Table 3-4.

Table 3-4. Condition of Riparian Habitat

Functioning Condition	Riparian Habitat in the PFO	Percent of Riparian Areas in the PFO
Proper Functioning Condition	783 miles	76
Functioning at Risk—Upward Trend	83 miles	8
Functioning at Risk—Stable Trend	104 miles	10
Functioning at Risk—Downward Trend	34 miles	3
Nonfunctioning	20 miles	2

Source: BLM Price Field Office

Riparian functioning condition assessments have been completed for the PFO. Table 3-4 shows that 76 percent of the riparian areas are in PFC and 8 percent are in functioning at risk with upward trend. The remaining 15 percent are either functioning at risk with a stable trend, functioning at risk with a downward trend, or not functioning. Under current management, the PFO would continue to conduct riparian functioning condition assessments and make necessary resource management adjustments to achieve riparian objectives.

Definitions of the riparian conditions are listed below:

Proper Functioning Condition—The ability of the riparian area to dissipate energy, filter sediment, transfer nutrients, and develop ponds and channel characteristics that benefit wildlife populations and improve water retention and groundwater recharge, while improving stream bank stability and supporting greater biodiversity.

Functioning at Risk—Riparian-wetland areas that are in functional condition but an existing soil, water, or vegetation attribute makes them susceptible to degradation.

- **Upward Trend**—Those riparian areas in which changes in management strategies have shown an increase in riparian vegetative communities and improved bank stability.
- **Stable Trend**—Those riparian areas that have not demonstrated significant upward or downward trends in vegetative communities and/or bank stability.
- **Downward Trend**—Those riparian areas in which there has been a significant deterioration in riparian vegetative communities, a decrease in bank stability, and an increase in erosion of stream banks.

Nonfunctioning—Riparian areas where stream flow has been altered, the stream channel is degraded, vegetation is insufficient to naturally reseed the area, exotic plant species (i.e., tamarisk) are present, and there is a lack of structural components such as woody debris.

3.2.3 Vegetation

The PFO lies within parts of three defined geographic regions, known as major land resource areas (MLRA), as described by U.S. Department of Agriculture, Natural Resources Conservation Service (USDA, 1981):

- The Colorado and Green River Plateaus area is within the 6- to 12-inch precipitation zone. The San Rafael Desert falls within this MLRA. The vegetation includes desert brush and grassland.
- The Central Desert Basins, Mountains, and Plateaus area is in the 6- to 9-inch precipitation zone. The majority of the PFO falls within this MLRA. The vegetation is primarily pinyon-juniper, sagebrush, and grass-like.
- The Wasatch and Uinta Mountains area is in the 15- to 18-inch precipitation zone. The western side of the PFO falls within this MLRA. These higher elevations support mostly mixed conifer, aspen, and ponderosa pine.

Distribution of vegetation types within the PFO can be attributed primarily to a combination of climate, soils, and topography. Water availability and soil composition are particularly important. Altitude changes between valley floors and plateau tops also affect vegetation. Saline and alkaline soils greatly influence plant growth.

There are four known areas of isolated relict plant communities in the PFO. Relict plant communities contain unique vegetation assemblages as well as associated wildlife species that are not found elsewhere in the PFO. The unique quality of these areas is directly related to their isolation over time or from disturbance. This isolation also provides an opportunity to gauge impacts occurring elsewhere in the PFO and on the Colorado Plateau. The areas of Bowknot Bend, North Big Flat Top, Hebes Mountain, and the San Rafael Reef have potential value for scientific study and for comparison with similar communities that have been grazed (BLM, 1989a; BLM, 1991a).

3.2.3.1 Vegetation Cover Types

Vegetation varies depending on soils, climate, aspect, elevation, and topography. Moisture and elevation are the factors most often responsible for vegetation distribution. Based on the Utah Geographic Approach to Planning (GAP) data for land cover, vegetation in the PFO is classified into nine vegetation cover types and one non-vegetation type (USGS, 1995). Map 3-5 shows the location of the nine cover types within the PFO. The vegetation categories are mixed conifer, aspen, ponderosa pine, oak, mountain shrub, pinyon-juniper woodland, sagebrush, grass-like, and desert brush.

Table 3-5 presents the number of acres in each of the categories. The following paragraphs provide a brief description of other vegetation species associated with that cover type.

Table 3-5. Vegetation Cover Types within the PFO

Cover Type	Acres on BLM Lands Within PFO
Other Non-Vegetation	31,259
Mixed Conifer	49,294
Aspen	9,279
Ponderosa Pine	11,522
Oak	4,123
Mountain Shrub	1,997
Pinion-Juniper Woodland	682,842
Sagebrush	285,174
Grass-Like	469,796
Desert Brush	933,990

Non-Vegetation

This cover type contains urban areas, developed agricultural fields that are used for row crops or are irrigated, and residential, industrial, and commercial areas. Also included in this cover type are areas that are classified as barren. Barren areas include salt flats, sand, playas, and lava flows.

Mixed Conifer

Tree species in mixed conifer areas are white spruce (*Picea engelmannii*), Douglas-fir (*Pseudotsuga menziesii*), white fir (*Abies concolor*), subalpine fir (*Abies lasiocarpa*), and lodgepole pine (*Pinus contorta*). On some aspects and elevations, ponderosa pine (*Pinus ponderosa*), limber pine (*Pinus flexilis*), or bristle cone pine (*Pinus aristata*) may occur. This cover type is located in the northwestern and northeastern portion of the PFO.

Mixed conifer stands provide cover and nesting habitat for a variety of wildlife species. Understory vegetation and vegetative structure play important roles in determining use by big game and livestock. Generally, open stands of mixed conifer with a grass and forb understory provide higher value habitat for livestock. Closed mixed conifer stands provide habitat for small mammal and rodents, which are a food source for birds of prey.

Aspen

Deciduous forests principally dominated by quaking aspen (*Populus tremuloides*) are located in the northeastern and northwestern portions of the PFO. Containing some coniferous species, this cover type is at slightly lower elevations than mixed conifer. Conifer species associated with aspen stands include ponderosa pine (*Pinus ponderosa*), lodgepole pine (*Pinus contorta*), Douglas-fir (*Pseudotsuga menziesii*), and spruce species (*Picea spp.*). Aspen is a transitional or ephemeral vegetation cover type and changes over time. Unless there is a disturbance such as fire or logging, the aspen vegetation type is replaced by the mixed conifer type.

Quaking aspen forests provide important breeding, foraging, and resting habitats for a variety of birds and mammals. Wildlife and livestock use of quaking aspen communities varies with species composition of the understory and relative age of the quaking aspen stand. Young stands provide the most browse for big game and livestock. Quaking aspen buds, catkins, and leaves provide an abundant and nutritious, yearlong food source for ruffed grouse.

Ponderosa Pine

Interior ponderosa pine and shrub communities in the PFO are usually the lowest elevation coniferous forest type, and they border shrublands or pinyon-juniper woodlands. Dominant understory species include curlleaf mountain-mahogany (*Cercocarpus ledifolius*), greenleaf manzanita (*Arctostaphylos patula*), black sagebrush (*Artemisia nova*), Gambel oak (*Quercus gambelii*), and mountain snowberry (*Symphocarpus oreophilus*). Ponderosa pine associated with mountain muhly (*Muhlenbergia montana*) also occurs in the PFO (Youngblood, 1985). Other tree species associated with the ponderosa pine cover type are single-needle pinyon (*Pinus monophylla*), juniper (*Juniperus spp.*), Douglas-fir (*Pseudotsuga menziesii*), and white fir (*Abies concolor*).

Ponderosa pine cover types and associated vegetation communities are important wildlife habitat. The forest understory provides valuable browsing and grazing for wildlife and livestock. Ponderosa pine provides roosting, nesting, and foraging habitat for the Mexican Spotted Owl. The mixed-conifer, interior ponderosa pine, and Gambel oak types provide optimal habitat for the owl, which is a federally listed species (Ganey et al., 1999).

Oak

In the PFO, Gambel oak (*Quercus gambelii*) is the dominant species on south-facing slopes at elevations of 6,500 to 7,800 feet (Harper et al., 1985). Other species associated with Gambel oak are fir species (*Abies spp.*), maple species (*Acer spp.*), Utah serviceberry (*Amelanchier utahensis*), and sagebrush (*Artemisia spp.*).

Oak woodlands provide food and shelter to numerous wildlife species. Gambel oak is a major forage species for deer and elk (Mower et al., 1989), and the acorn crop provides a major food source for Merriam's turkeys (USFS, 2004). Mule deer use oak woodlands during the winter to provide browse and cover, although use is greatest when the average height is less than 15 feet (USFS, 2004).

Mountain Shrub

In the PFO, mountain shrubs may form a distinct belt on mountain slopes and ridge tops above pinyon-juniper woodlands. These communities are usually found at elevations of 5,000 to 7,000 feet. The mountain shrub community exhibits a mosaic pattern of several co-dominant shrub species distributed across a diverse landscape. Other plant species associated with mountain shrub include mountain

mahogany (*Cercocarpus spp.*), scrub oak (*Quercus spp.*), bigtooth maple (*Acer grandidentatum*), antelope bitterbrush (*Purshia tridentata*), Stansbury cliffrose (*Purshia mexicana* var. *stansburiana*), mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*), pachistima (*Pachistima myrsinites*), ninebark (*Physocarpus malvaceus*), ceanothus (*Ceanothus spp.*), serviceberry (*Amelanchier spp.*), chokecherry (*Prunus virginiana*), bitter cherry (*Prunus emarginata*), and snowberry (*Symphoricarpos spp.*) (USFS, 2004).

Mountain shrub provides valuable forage and browse for big game species and livestock. Some species, such as serviceberry, provide a valuable food source for birds, including sage-grouse. Mountain shrub communities are identified as priority breeding habitats for migratory birds.

Pinyon-Juniper Woodlands

The pinyon-juniper woodland associations inhabit semi-desert and upland zones throughout the PFO. This type includes mixes of pinyon and juniper trees and areas that are strictly pinyon or juniper trees. The dominant species of the pinyon-juniper type are the Utah juniper (*Juniperus osteosperma*) and pinyon pine (*Pinus edulis*). The pinyon-juniper woodland distribution is limited because of low precipitation, high temperatures, and saline soils. Stands vary from quite dense to sparse with shrub and grass understory.

Pinyon-juniper woodlands provide shelter and forage for numerous species of wildlife. Succession changes the quantity and variety of wildlife species using pinyon-juniper woodlands (Balda et al., 1980). Pinyon and juniper trees out-compete all other vegetation for moisture and, at climax, only a scattering of understory remains (BLM, 1991).

Sagebrush

In the PFO, dominant sagebrush species include big sagebrush (*Artemisia tridentata* var. *tridentata*) and Wyoming sagebrush (*Artemisia tridentata* *Wyomingensis*). Other sagebrush species include bud sagebrush (*Artemisia spinescens*) and fringed sagebrush (*Artemisia frigida*) (BLM, 1991). Common shrubs and grasses associated with sagebrush include broom snakeweed (*Gutierrezia sarothrae*), green rabbitbrush (*Chrysothamnus viscidiflorus*), galleta (*Hillaria jamesii*), blue gramma (*Bouteloua gracilis*), Indian ricegrass (*Oryzopsis micrantha*), and needle-and-thread grass (*Stipa comata*).

Big sagebrush provides cover for a variety of wildlife, including pronghorn antelope, mule deer, bighorn sheep, jackrabbits, shrub-nesting birds, and some ground-nesting birds, including sage-grouse. The cover of mature shrubs is especially important to pronghorn fawns and sage-grouse broods. Mid- to late-seral communities are important habitats for black-tailed jackrabbits and pygmy rabbits. In contrast, Townsend's ground squirrels, and raptors that rely on them as prey species, prefer open and grassy early seral sagebrush communities. Their numbers decline as plant succession advances toward late seral stages.

Grass-Like

Grass-like areas include desert and semi-desert climates. Grass-like areas are primarily perennial grasses intermixed with half shrubs, occasional shrubs, and annual grasses. The dominant grass species are Indian ricegrass (*Oryzopsis micrantha*), galleta (*Hillaria jamesii*), and blue gramma (*Bouteloua gracilis*). Other grasses include sand dropseed (*Sporobolus cryptandrus*), threeawn species (*Aristida spp.*), needle-and-thread (*Stipa comata*), squirreltail (*Sitanion hystrix*), and western wheatgrass (*Agropyron smithii*). Other common plants are shadscale (*Artiplex confertifolia*), fourwing saltbush (*Artiplex canescens*), Mormon tea (*Ephedra viridis*), black sagebrush (*Artemisia nova*), low sagebrush (*Artemisia*

arbuscula), green rabbitbrush (*Chrysothamnus viscidiflorus*), winterfat (*Ceratoides lanata*), and broom snakeweed (*Gutierrezia sarothrae*) (BLM, 1991).

Grass-like areas provide forage for wildlife and livestock. Some mature grass species, such as threeawn, are less palatable to wildlife and livestock, whereas other species, such as blue grama, provide excellent forage for wildlife and livestock. Grass-like areas also provide nesting habitat for ground-nesting species and provide habitat for ferruginous hawks.

Desert Shrub

Desert shrub is characterized by low-growing shrub communities, which frequently occur in saline-alkaline soils at lower elevations (e.g., valley floors, bottomlands, and floodplains of intermittent and perennial streams). Poor drainage conditions and low precipitation cause soil salts to accumulate in these lowlands, significantly affecting plant growth. Shadscale (*Artiplex confertifolia*), blackbrush (*Coleogyne ramosissima*), and black greasewood (*Sarcobatus vermiculatus*) are the dominant shrub species. Other plants associated with this cover type are alkali sacaton, saltgrass (*Distichlis stricta*), Indian ricegrass (*Oryzopsis micrantha*), galleta (*Hilaria jamesii*), and Mormon tea (*Ephedra viridis*).

Galleta and Indian ricegrass are the most important understory plants. Both are salt tolerant, but galleta's competitive advantage, aided by continual spring grazing, has resulted in an increase of galleta and a decrease in Indian ricegrass. (BLM, 1991b). Livestock usually avoid areas dominated by saltgrass for forage, but the dense mats of vegetation provide good cover for small mammals.

3.2.3.2 Exotic or Introduced Plants

The PFO supports a number of exotic or introduced plants. Introduced plants are those planted as part of vegetative treatments or rehabilitation projects. Six of these plant species have the greatest influence on the management of land in the area: crested wheatgrass, Russian wildrye, smooth brome, forage kochia, cheatgrass, and tamarisk (BLM, 1989b). Crested wheatgrass, Russian wildrye, and smooth brome are grasses that have been planted as part of vegetative treatments or rehabilitation projects. Forage kochia has also been used for rehabilitation.

Crested Wheatgrass

Crested wheatgrass (*Agropyron cristatum* and *A. desertorum*) is a cool season bunchgrass. It is drought tolerant and is used chiefly in arid and semi-arid areas for seeding rangeland in poor condition. Beginning in the 1960s, thousands of acres in the PFO were seeded to crested wheatgrass. Crested wheatgrass is also useful for reclamation of disturbed areas. It provides good watershed protection and good forage.

Russian Wildrye

Russian wildrye (*Elymus junceus*) is a long-lived bunchgrass that grows rapidly in the spring and produces abundant basal leaves that remain green through summer and fall. It endures close grazing better than most grasses and it withstands drought. Russian wildrye is adapted to sagebrush, mountain brush, and pinyon-juniper sites and is useful on soils too alkaline for other grasses.

Smooth Brome

Smooth brome (*Bromus inermis*) is a long-lived, sod-forming grass that is very palatable and productive for livestock grazing. It suppresses re-invasion of undesirable vegetation. Smooth brome is very useful for erosion control.

Forage Kochia

Forage kochia (*Kochia prostrata*) is a perennial shrub introduced from southern Eurasia. It does not become established at a site unless specifically planted. Forage kochia provides valuable livestock and wildlife forage during winter periods and dry seasons, provides food and cover for upland game birds, and is useful for rangeland reclamation. It persists on disturbed, harsh soils with high salt content and will out-compete less desirable range grasses such as cheatgrass.

Cheatgrass

Cheatgrass (*Bromus tectorum*) is an annual grass found throughout the PFO. It is most apt to occur on degraded and disturbed riparian areas, and it frequently forms a monotype on burn sites. This can be seen in numerous areas along the Green River, Price River, and Rock Creek. It is also found on disturbed areas such as drill pads, borrow pits, cleared rights-of-way (ROW), and others. The seeds germinate in the fall and green up early in the spring. Cheatgrass stays green for an average of 6 weeks. Cured cheatgrass is a very flashy fuel and is a major fire hazard where it occurs in significant amounts, potentially increasing fire cycles from more than 30 years in sagebrush communities to 2–5 years in the cheatgrass dominated areas.

Tamarisk

Tamarisk (*tamarix ramosissima*) is extremely deep rooted, uses much more water than native cottonwood and willow communities, and has the ability to sequester salts in its lower leaves and then shed them, resulting in buildup of salts in upper soil horizons and litter. Tamarisk invades these areas, frequently displacing native plant species, and reinvades rapidly after wildland fire. Tamarisk is common and frequently forms pure stands along the Green and Price rivers and is showing up along numerous other drainages in the PFO.

The Green River though Desolation and Gray Canyon is one area where tamarisk is being replaced by native willow. The green line aspect of this river has changed over the last 25 years, from tamarisk to willow. BLM attributes this change to the removal of cattle from the area and modified flows from Flaming Gorge Dam, which mimic a more natural flow regime.

3.2.3.3 Invasive, Noxious, and Poisonous Plants

All federal, state, and local laws and regulations govern the PFO invasive and noxious species program. BLM has two existing memorandums of understanding (MOU) with Carbon and Emery counties for noxious weed control. Utah Department of Agriculture has identified 18 noxious weeds, and Carbon County has also listed Russian olive. In addition, in 2003, the PFO entered into a cooperative agreement with other federal, state, and local agencies as a cooperating agency with the newly formed Skyline Cooperative Weed Management Area (CWMA). CWMAs efforts over the past 2 years to control and eradicate invasive and noxious plants on public lands have been through inventory, treatment, and grant proposals.

BLM works cooperatively with other federal, state, county agencies as well as private landowners to prevent and control the spread of noxious weeds. Noxious plants are those that infest either land or water resources and cause physical or economic damage. Table 3-6 lists the name, estimate of acres infested, general trend, and treatment comments.

In 1997–1998, an extensive inventory of noxious weeds was performed in both Emery and Carbon counties. Although the survey focused primarily along roads, it provided a broad assessment of the major weeds likely to be found within the planning area. At least minor occurrences of all state- and county-listed noxious weeds were found in both counties. Priorities and strategies for treatment are determined through the existing MOUs and the Skyline CWMA.

Table 3-6. Invasive and Noxious Plants on Public Lands within the PFO

Common Name	Scientific Name	Infested Acres	General Trend Treatment Comments
Musk Thistle	<i>Carduus nutans</i>	200	Infested acres are increasing by about 10% annually. Chemical and biological control are being used to control the spread of musk thistle.
Russian Knapweed	<i>Centaruea repens</i>	100	Infested acres increasing by 5% annually. Major efforts by CWMA to control the spread of Russian knapweed.
Purple Loosestrife	<i>Lythrum salicaria</i>	1	Infestation is considered stable and major efforts by CWMA are to control the spread of purple loosestrife.
Scotch Thistle	<i>Onopordum acanthium</i>	5	Infestation is considered stable and isolated.
Canadian Thistle	<i>Cirsium arvense</i>	10	Infestation is considered stable and isolated.
Hoary Cress	<i>Cardaria draba</i>	4	Infestation is considered stable; however, some infestations located on private lands are encroaching onto public lands.
Black Henbane	<i>Hyoscyamus niger</i>	4	Infestation is considered stable and isolated.
Tamarisk (Salt Cedar)	<i>Tamarix ramosissima</i>	8,000	Infestation is considered stable, and no efforts are under way to control tamarisk on public lands.
Broad-leaved Peppergrass	<i>Lepidium latifolium</i>	210	Infestation is considered stable, and most of the infestations are located along the Green River.
Russian Olive	<i>Elaeagnus angustifolia</i>	65	Infestation is considered stable. Carbon and Emery counties' efforts are to limit Russian olive to the existing population.
Houndstongue	<i>Cynoglossum officinal</i>	70	Infestation is considered stable. Efforts by Carbon County are to control houndstongue along roadsides.
Bindweed (Morning Glory)	<i>Convolvulus spp.</i>	60	Infestation is considered stable, and no efforts are under way to control bindweed on public lands.
Spotted Knapweed	<i>Centaurea maculosa</i>	>1	Infestation is considered stable and isolated.
Buffalo Bur	<i>Solanum rostratum</i>	>1	Infestation is considered stable and isolated.

Source: BLM inventories and treatment reports 1996–2003.

Aggressive treatments are used on seven of the invasive species within the PFO: musk thistle, Russian knapweed, whitetop, Canadian thistle, scotch thistle, black henbane, and purple loosestrife. Carbon and Emery counties treat approximately 150 infested acres annually. Counties are reimbursed for treatment costs on public lands managed by the BLM, based on annual funding.

Natural gas companies with mineral leases treat an additional 50 acres along pipelines, roads, and well pads. These treatments are applied through a pesticide use proposal (PUP) that ensures approved pesticides are used on public lands.

Soil-disturbing activities may cause an increase in invasive species. Activities authorized by the PFO (i.e., oil and gas development, mineral extraction, ROWs) are responsible for the control of invasive and noxious species through stipulations on permits and authorizations.

Multiple poisonous plants occur in the PFO. Several native plants are toxic because selenium is concentrated in their tissues. Most of these plants are unpalatable and seldom eaten by livestock or wildlife. Several species of locoweed (*Astragalus spp*) occur throughout the PFO (BLM, 1989b). Table 3-7 lists poisonous plants.

Table 3-7. Poisonous Plants

Common Name	Scientific Name
Milkweed	<i>Asclepias spp</i>
Locoweed	<i>Astragalus spp/Oxytropis spp</i>
Halogeton	<i>Halogeton glomeratus</i>
Copperweed	<i>Oxtenia acerosa</i>
Russian thistle	<i>Sarcobatus salsoakali</i>
Desert Prince's Plume	<i>Stanleya pinnata</i>

Source: BLM, 1991a, BLM 1989a.

3.2.4 Cultural

Less than 5 percent of the PFO has been inventoried for cultural resources. Through this inventory, more than 2,000 sites have been identified. Given the current number of acres inventoried and the current number of sites, archeologists estimate that there may be thousands more sites throughout the PFO. Regardless of the statistical estimation, the fact remains that the potential for cultural resources is extremely high throughout the PFO.

Overviews of known cultural resources in the area show a wide range of cultural resources contained within the PFO. These resources range in age from a 12,000-year-old Paleo-Indian site to remains from more the recent mining and homesteading period of the nineteenth century. The PFO is considered to be the center of the Fremont culture, and its abundant cultural resources show human presence in the area over the past 12,000 years. The information that could be gained from cultural resources in the PFO is not available elsewhere. Opportunities for archeological research in the PFO are believed to be nearly unlimited. Most available information about cultural resources in the PFO is from mitigation of impacts from surface disturbance, although academic institutions pursuing research have performed some excavations.

Some cultural resources in the PFO are well preserved, whereas others have been destroyed. The fragile nature of cultural resources makes them prone to damage, whether naturally or through human activity. Many sites have been damaged, intentionally or unintentionally, through human activity over the past 100 years. In the areas where human activities do not occur or have not occurred, or where they do so minimally, there is usually little change in the condition of the resources. The impact to cultural resources in these conditions results primarily from exposure to natural processes.

Piecemeal degradation of systematic resources is a concern to cultural resource management. Resources such as historic highways, railroad grade, fence lines, ditches, and other linear resources may be affected in a piecemeal fashion through approved actions to portions of the systems. The loss of data resulting from individual actions is minimal, but cumulative actions result in the loss of information to the system as a whole.

Because most cultural resource information has come from mitigation of surface-disturbing activities and the Interim Management Policy (IMP) for lands under wilderness review has reduced the likelihood that surface disturbance will occur, there is less potential for obtaining information on cultural resources in areas under wilderness review.

3.2.4.1 National Register and Well-Known Sites

Seven sites within the PFO are listed on the National Register of Historic Places (NRHP). Many others are eligible for listing. Current laws protect sites that are listed on the NRHP as well as those that are eligible. Those sites currently listed on the NRHP are as follows:

- Flat Canyon Archeological District
- Desolation Canyon National Historic Landmark
- Black Dragon Canyon Pictographs
- Buckhorn Wash Rock Art Sites
- San Rafael Bridge
- Denver and Rio Grande Lime Kiln (also known as Buckhorn Flat Lime Kiln)
- Rochester-Muddy Creek Petroglyph Site.

Other well-known districts, sites, and areas include the following:

- Nine Mile Canyon
- Head of Sinbad Rock Art Site
- Lone Warrior Rock Art Site
- Green River Desert Archeological District
- Power Pole Knoll
- Windy Ridge
- Crescent Ridge
- Innocents Ridge
- Cedar Creek Archeological District
- Molen Seep Wash
- Short Canyon
- Noel Morss' Temple Mountain Alcove
- Swaseys Cabin
- Red Hole Draw Rock Art Sites
- Clydes Cavern
- San Rafael Reef Rock Art District
- Pint-Size Shelter
- Coal Cliffs West Slope Archeological District
- Temple Mountain Uranium Mine
- Tomsich Butte Uranium Mine
- Copper Globe
- The Old Spanish Trail National Historic Trail.

3.2.5 Paleontology

Paleontological resources are contained in most of the sedimentary rock units of the PFO. The geographic extent of the PFO exposes 24 sedimentary geologic formations at the surface. A comprehensive paleontological resource inventory of these formations has not been completed for the PFO.

Cleveland-Lloyd Dinosaur Quarry (CLDQ) is an example of the type and concentration potential of paleontological resources within the PFO. CLDQ has yielded more than 12,000 fossilized dinosaur bones from the late Jurassic Period. These fossils have been unearthed by excavation efforts that have taken place since the 1920s (BLM, 1976). The bones recovered to date from CLDQ represent at least 12 genera and more than 70 individual dinosaurs. At least 100 mounted skeletons or replicas from this quarry are on exhibit in more than 65 museums throughout the world (BLM, 1976). Research at CLDQ continues through permitted activities of recovering and analyzing more fossilized bone, as well as analysis of the fossils already removed.

Two structures have been constructed over the bone bed to protect the bones from thieves, vandals, and the weather. One of the buildings is open with a catwalk inside to allow for closer viewing of bones still in the ground and partially exposed. Some bones are found together as they would have been in life, but most are scattered and jumbled. A layer about 1-yard thick contains more Jurassic dinosaur bones per square yard than has been found anywhere else in the world. The distinctiveness of the bone deposits at CLDQ has been documented. Vandalism, however, is a problem, and surface bone deposits have been damaged. Future opportunities for scientific excavation and research, public education, and educational recreation will be lost if CLDQ is not protected. Resources and opportunities at CLDQ will be protected and enhanced through the upgrade and installation of facilities at the site during 2004 and 2005.

Paleontological resources are integrally associated with the rock formations in which they are located. Each formation was formed through depositional processes that led to characteristic traits and potential for a certain type of fossil (see Table 3-8). If extensive excavation on a certain formation in one current geographic area results in substantial fossil resources, a potential exists that excavations throughout the extent of the formation will produce fossil material as well.

Table 3-8. Paleontological Formations Occurring in the PFO

Formations	Geologic Time Period	Depositional Environments	Types of Fossils Potentially Present
Surficial Deposits	Quaternary	Unconsolidated surface deposits (includes alluvium, colluvium, pediment mantle, eolian dunes, and deposits associated with landslides, slope-wash, alluvial fans, and terraces)	No potential for fossilized material in situ. Quaternary mammals have been discovered in both Carbon and Emery counties.
Green River Formation	Eocene	Lacustrine deposit that contains sediment from fluvial deposits	Plant, vertebrate, and trace vertebrate fossils are known to be present
Wasatch/Colton Formation	Eocene to Paleocene	Fluvial deposit with marginal lacustrine and deltaic facies	Contains invertebrate fossils
Flagstaff Limestone	Paleocene to Upper Cretaceous	Marine deposit	Contains invertebrate fossils
North Horn Formation	Cretaceous/Tertiary	Fluvial deposit with some lacustrine facies	Known to contain vertebrate and plant fossils
Price River Formation	Upper Cretaceous	Fluvial and floodplain origin	Contains plant fossils

Formations	Geologic Time Period	Depositional Environments	Types of Fossils Potentially Present
Castlegate Sandstone	Upper Cretaceous	Fluvial origin	No known fossils
Blackhawk Formation	Upper Cretaceous	Deltaic and inter-deltaic deposit	Known to contain plant and trace vertebrate fossils
Star Point Sandstone	Upper Cretaceous	Beach sand and intermediate marine shale	Unknown
Mancos Shale	Upper Cretaceous	Shallow marine shelf transitional to delta plains deposit	Invertebrate, vertebrate, and trace vertebrate fossils are uncommon
Dakota Sandstone	Upper Cretaceous	Beach to marginal marine/deltaic deposit	Plant and invertebrate fossils are present
Cedar Mountain Formation	Lower Cretaceous	Fluvial, or river, depositional environment	Vertebrates, traces of vertebrate, and plant fossils present
Morrison Formation	Upper Jurassic	Fluvial deposit	Vertebrate, invertebrate, trace vertebrate, and plant fossils present
Summerville Formation	Middle Jurassic	Tidal-flat deposit	Potential for trace vertebrate fossils
Curtis Formation	Middle Jurassic	Marine deposit	Invertebrate fossils present
Entrada Sandstone	Middle Jurassic	Nearshore eolian depositional environment	Contains trace vertebrate fossils
Carmel Formation	Middle Jurassic	Shallow marine to supratidal depositional environment	Contains invertebrate fossils
Navajo Sandstone	Lower Jurassic to Upper Triassic	Deposited in an eolian environment	Contains trace vertebrate and plant fossils
Kayenta Formation	Upper Triassic	A fluvial deposit	Plant, invertebrate, and trace vertebrate fossils
Wingate Sandstone	Upper Triassic	Eolian deposit	Trace vertebrate fossils
Chinle Formation	Upper Triassic	Deposited in a fluvial environment	Potential for vertebrate, plant, and trace vertebrate fossils in this bench forming rock
Moenkopi Formation	Middle to Lower Triassic	Marine deposit	Vertebrate, invertebrate, and trace vertebrate fossils
Kaibab Limestone	Lower Permian	Marine deposit	Invertebrate fossils common
Cedar Mesa Member (Cutler Formation)	Lower Permian	Eolian deposited sandstone	No known fossils present
Hermosa Group	Pennsylvanian	Marine deposit	Invertebrate fossils present

Sources: Stokes, 1986; USGS, 1987, 1988, 1990, 1991.

3.2.6 Visual

The PFO contains a diverse array of visual resources and outstanding scenery associated with remote areas and unique natural and geologic features. The PFO is located within the Colorado Plateau physiographic province. The landform of the PFO includes dramatic canyons, open desert plains, rugged mountains and ridges, and meandering desert rivers that traverse the area. Portions of the PFO with high scenic quality include Desolation Canyon, Nine Mile Canyon, the San Rafael Swell, Labyrinth Canyon, Range Creek, and Gordon Creek areas. Many of these areas are sensitive to landscape alterations because of heavy recreation visitation and the presence of other sensitive resources. Many of the high scenic quality areas are frequently viewed.

The San Rafael Swell is one of the region's most well-known and popular scenic attractions. The Interstate 70 ACEC is managed to maintain the scenic qualities of the San Rafael Swell where the

interstate bisects the area. Within the San Rafael Swell, features such as the Wedge Overlook, San Rafael Reef, Mexican Mountain, Temple Mountain, and Buckhorn Draw attract high levels of recreation visitation because they provide visual evidence of the geologic processes that created the San Rafael Swell. Desolation Canyon is another well-known and popular scenic area within the PFO. River recreationists travel the river corridor to experience steep walled canyons carved by the Green River. Undisturbed scenery lines nearly 80 miles of the Green River in the northeastern portion of the PFO.

Nine Mile Canyon contains a regionally significant concentration of cultural resource sites within a steep-walled canyon. The rugged canyon contains numerous petroglyphs and other cultural resource sites visible from the county road that follows the canyon bottom. Labyrinth Canyon is another portion of the PFO with high quality scenery associated with a river corridor in a remote and rugged canyon setting. The Green River enters Labyrinth Canyon south of its confluence with the San Rafael River and slowly meanders through high-walled cliffs eventually leading toward Canyonlands National Park.

The PFO contains several other desert river corridors with outstanding scenic characteristics including the Price River, San Rafael River, and Muddy Creek. Visitors in these areas can view an array of desert river landscapes and their associated riparian habitats. Features such as river oxbows, deep canyons, and lush vegetation are associated with these corridors in contrast to much of the remainder of the PFO. In addition, several scenic byways exist within the PFO to highlight the area's scenic, geologic, cultural, and paleontological resources.

The existing Visual Resource Inventory (VRI) classifications for the PFO are based on an inventory conducted in the 1970s. Management has been updated as a result of changed resource conditions and improved mapping capability. Changes in resource conditions include new facilities and increased visitation in viewing areas; however, the amount of change allowed in each visual resource management (VRM) class must meet that class objective (see Tables 3-9 and 3-10).

All Wilderness Study Areas (WSA) are managed as VRM Class I until plan actions are made, which determine WSAs to be managed to meet VRM Class I objectives, per BLM policy. Bowknot Bend, Muddy Creek, upper and lower portions of San Rafael Canyon, San Rafael Reef, and Segers Hole Areas of Critical Environmental Concern (ACEC) are managed as VRM Class I in accordance with the 1991 San Rafael RMP. In addition, a scenic ACEC is associated with the I-70 corridor that is managed as VRM Class I. Desolation Canyon National Historic Landmark (NHL) is also managed as VRM Class I (1 mile on each side of the Green River from Nine Mile Canyon to Florence Creek). The area of Desolation Canyon NHL that overlaps with the Nine Mile Canyon Recreation and Cultural Resources Management Area (which is designated as VRM Class II) is managed as VRM Class I. Areas managed as VRM Class I are assigned to this category on Map 2-1 of Chapter 2.

Table 3-9. Existing VRM Classes in the PFO

VRM Class	Acres
I	661,305
II	570,625
III	1,367,186
IV	1,033,158

Table 3-10. VRM Class Objectives

Classification	Objective
I	To preserve the existing character of the landscape. The level of change to the characteristic landscape should be very low and must not attract attention.
II	To retain the existing character of the landscape. The level of change to the

Classification	Objective
	characteristic landscape should be low.
III	To partially retain the existing character of the landscape. The level of change to the characteristic landscape should be moderate.
IV	To provide for management activities that require major modification of the existing character of the landscape. The level of change to the characteristic landscape can be high.

Source: BLM Handbook H-8410-1, Visual Resource Inventory.

3.2.7 Special Status Species

Special status species include those plant and animal species federally listed as Threatened, Endangered, Proposed, or Candidate, as well as BLM and State of Utah sensitive plant and animal species. Candidate species are managed in a manner to prevent federal listing from occurring. The restricted distributions, specialized habitat requirements, and population pressures (human-induced and natural) facing special status species contribute to a high potential for extinction; thus, their populations are of conservation interest.

Consultation is required on any action that a federal agency proposes or authorizes that may affect a federally listed species. If it is determined by the federal agency, with the written concurrence of the U.S. Federal Fish and Wildlife Service (USFWS), that the action is not likely to adversely affect listed species or critical habitat, the consultation process is complete, and no further action is necessary. Consultation (50 CFR 402.14) is required if the federal agency determines that an action is likely to adversely affect a listed species or will result in jeopardy or adverse modification of critical habitat (50 CFR 402.02). Federal agencies should also confer with the USFWS on any action that is likely to jeopardize the continued existence of any proposed species or result in the destruction or adverse modification of a proposed critical habitat (50 CFR 402.10). According to BLM Manual 6840, all non-listed special status species are to be managed in a manner, "...that actions authorized, funded, or carried out by the BLM do not contribute to the need for the species to become listed." This includes sensitive species as well as candidate species.

3.2.7.1 Special Status Plants

USFWS identified 18 special status plant species that are known to occur in the PFO, as listed in Table 3-11). As of February 2004, Appendix 4 – Listed, Sensitive and other Native Species contains a list of all species as provided by the Utah Field Office of USFWS.

Table 3-11. Federally Listed and Sensitive Plant Species in the PFO

Common Name	Scientific Name	Status
Barneby Reed-Mustard	<i>Schoenocarmbe banebyi</i>	Federally Endangered
San Rafael Cactus	<i>Pediocactus despainii</i>	Federally Endangered
Wright Fishhook Cactus	<i>Sclerocactus wrightiae</i>	Federally Endangered
Jones Cycladenia	<i>Cycladenia jonesii</i>	Federally Threatened
Last Chance Townsendia	<i>Townsendia aprica</i>	Federally Threatened
Maguire Daisy	<i>Erigeron maguirei</i>	Federally Threatened
Winkler Cactus	<i>Pediocactus winkleri</i>	Federally Threatened
Uinta Basin Hookless Cactus	<i>Sclerocactus glaucus</i>	Federally Threatened
Graham's Beardtongue	<i>Penstemon grahamii</i>	Federal Candidate
Alcove Bog-Orchid	<i>Habenaria zothecina</i>	Sensitive Species
Basalt Milk-Vetch	<i>Astragalus subcinereus basalticus</i>	Sensitive Species
Book Cliffs Blazing-Star	<i>Mentzelia multicaulis labrina</i>	Sensitive Species
Cedar Mountain Flame-Flower	<i>Talinum thompsonii</i>	Sensitive Species
Creutzfeldt-Flower	<i>Cryptantha creutzfeldtii</i>	Sensitive Species

Common Name	Scientific Name	Status
Entrada Skeleton-Weed	<i>Lygodesmia entrada</i>	Sensitive Species
Jones Indigo-Bush	<i>Psoralea polydenia jonesii</i>	Sensitive Species
Mussentuchit Gilia	<i>Aliciella (Gilia) tenuis</i>	Sensitive Species
Smith Wild-Buckwheat	<i>Eriogonum smithii</i>	Sensitive Species

3.2.7.2 Special Status Fish and Wildlife

Map 3-6 shows rivers that have been designated as critical by USFWS. Furthermore, USFWS, BLM, and Utah Division of Wildlife Resources (UDWR) have identified 27 special status fish and wildlife species that are known to occur in the PFO (see Table 3-12).

Table 3-12. Special Status Species in the PFO

Common Name	Scientific Name	Status
Amphibians		
Arizona Toad	<i>Bufo micrascaphos</i>	State Species of Concern
Western Toad	<i>Bufo boreas</i>	State Species of Concern
Birds		
Southwestern Willow Flycatcher	<i>Empidonax traillii extimus</i>	Federally Endangered
Bald Eagle	<i>Haliaeetus leucocephalus</i>	Federally Threatened
Mexican Spotted Owl	<i>Strix occidentalis lucida</i>	Federally Threatened
Western Yellow-Billed Cuckoo	<i>Coccyzus americanus occidentalis</i>	Federal Candidate
Greater Sage-Grouse	<i>Centrocercus urophasianus</i>	Petitioned for Federal Listing
Golden Eagle	<i>Aquila chrysaetos</i>	Eagle Protection Act
Ferruginous Hawk	<i>Buteo regalis</i>	USFWS BCC ¹ , PIF ² Priority Species
Black-Throated Gray Warbler	<i>Dendroica nigrescens</i>	USFWS BCC ¹ , PIF ² Priority Species
Broad-Tailed Hummingbird	<i>Selasphorus platycercus</i>	USFWS BCC ¹ , PIF ² Priority Species
Brewer's Sparrow	<i>Spizella breweri</i>	USFWS BCC ¹ , PIF ² Priority Species
Swainson's Hawk	<i>Buteo swainsoni</i>	USFWS BCC ¹
Peregrine Falcon	<i>Falco peregrinus</i>	USFWS BCC ¹
Loggerhead Shrike	<i>Lanius ludovicianus</i>	USFWS BCC ¹
Prairie Falcon	<i>Falco mexicanus</i>	USFWS BCC ¹
Pinyon Jay	<i>Gymnorhinus cyancephalus</i>	USFWS BCC ¹
Gray Vireo	<i>Vireo vicinior</i>	PIF ² Priority Species
Sage Sparrow	<i>Amphispiza belli nevadensis</i>	PIF ² Priority Species
Virginia's Warbler	<i>Vermivora virginiae</i>	PIF ² Priority Species
Burrowing Owl	<i>Athene cunicularia</i>	State Species of Concern
Mammals		
Black-Footed Ferret	<i>Mustela nigripes</i>	Federally Endangered Extirpated in PFO
White-Tailed Prairie Dog	<i>Cynomys leucurus</i>	Petitioned for Federal Listing
Fish		
Humpback Chub	<i>Gila cypha</i>	Federally Endangered
Bonytail Chub	<i>Gila elegans</i>	Federally Endangered
Colorado Pikeminnow	<i>Ptychocheilus lucius</i>	Federally Endangered
Razorback Sucker	<i>Xyrauchen texanus</i>	Federally Endangered
Flannelmouth Sucker	<i>Catostomus latipinnis</i>	State Species of Concern
Roundtail Chub	<i>Gila robusta</i>	State Threatened
Bluehead Sucker	<i>Catostomus discobolus</i>	State Species of Concern

Common Name	Scientific Name	Status
<i>Source:</i> USFWS, 2004.		
¹	The USFWS 2002 List of Birds of Conservation Concern (BCC) identifies those migratory and non-migratory avian species that, without additional conservation actions, are likely to become candidates for listing under the Endangered Species Act of 1973 (ESA)(16 USC 1513-1543).	
²	Partners in Flight (PIF) Priority Species are those species recognized by Utah Partners in Flight as birds most in need of conservation. Management issues, conservation recommendations, and suggestions for research and educational outreach are described for these species in the Utah Partners in Flight Avian Conservation Strategy.	

BLM and the State of Utah coordinate activities related to the protection and enhancement of federally and state sensitive listed species located in the PFO area. These actions include ongoing efforts to survey population levels, protect critical habitats, and determine potential areas for habitat restoration and recovery activities. The PFO contains 232,875 acres of designated critical habitat for the Mexican Spotted Owl (Map 3-6). BLM also coordinates and consults with the USFWS for activities related to the protection and enhancement of federally listed species in the PFO.

Raptors

The PFO area includes considerable habitat of value to raptors. This includes nesting and migratory habitats in the rimrock canyons west and north of the city of Price. Other areas of importance are the Book Cliffs east of Price and Desolation and Gray Canyons. Specific raptor species that nest in the PFO area include golden eagle, prairie and peregrine falcon, redtail and ferruginous hawk, American kestrel, Coopers and sharpshinned hawk, goshawk, and great horned, sawwhet, and burrowing owls. Within the PFO area, bald eagles use two important winter range areas. They include the Green River corridor, where approximately 20 to 30 birds annually congregate, and the Gordon Creek area that is used by approximately 15 to 20 eagles per year. In addition, the PFO contains 232,875 acres of designated critical habitat for the Mexican Spotted Owl (Map 3-6).

All native fish species except the Colorado River cutthroat trout (a BLM sensitive species) are considered non-game species. Anglers are prohibited from taking the following fish located in the lower Price River: federally listed endangered species include the Colorado pikeminnow, humpback chub, bonytail chub, razorback sucker, and BLM sensitive species include roundtail chub, flannelmouth sucker, and bluehead sucker. Research and management efforts are currently under way to improve the status of all listed species. Habitat for these species has historically included the Green River, lower Price River, San Rafael River, and Muddy Creek. These waters seasonally represented spawning and rearing habitats. The Green River is designated critical habitat for the above-mentioned federally listed species.

3.2.8 Fish and Wildlife

BLM has the primary responsibility for the management of habitats within the PFO. The UDWR has the responsibility for managing species in cooperation with BLM. Owing to administrative overlapping responsibilities, BLM and UDWR coordinate many of their activities as equal partners. The BLM's objective is to maintain, protect, and enhance the density and diversity of native fish and wildlife resources through sound habitat management practices and actions.

The diverse fish and wildlife resource in the PFO is extremely valuable in terms of ecological function of the natural environment as well as providing regionally significant consumptive and non-consumptive recreational values to local, regional, and in some cases national publics. Direct and indirect recreational values associated directly or indirectly with fish and wildlife contribute substantially and likely represent the majority of dispersed recreational use within the PFO. Consumptive recreational uses associated with

the fish and wildlife resource include big game, small game, upland game bird hunting, fishing, and fur trapping.

Non-consumptive uses directly associated with the fish and wildlife resource range from wildlife viewing (bird watching, big game viewing, etc.) to antler hunting (mule deer and elk). Statistics are not readily available on number of recreationists that engage in these uses, but it is likely these non-consumptive uses equal or exceed use levels for consumptive uses.

Ecological values of healthy sustainable fish and wildlife populations are at best difficult to quantify but cannot be overlooked or underestimated. Wildlife species have unique inter-specific relations, which link assemblages of species on a landscape to one another and to specific habitats contained within the landscape. Understanding this, it is easy to see that decisions, which affect a specific habitat could also affect a multitude of species and effect changes on a landscape basis. Some of these relationships are as simple as predator-prey relationships (i.e., mountain lion-mule deer) and some are more complex relationships such as prairie dog, burrowing owls, mountain plover, black-footed ferret, and ferruginous hawks. It is important to know that these relationships exist so that it is understood that the conservation measures for one particular wildlife species or habitat (i.e., riparian) are intended not only to conserve that species but also are linked to conservation of an entire assemblage of wildlife species and in some cases landscapes.

Habitat and wildlife within the PFO are representative of northern Great Basin and Colorado Plateau flora and fauna. Specific habitats of importance for the wildlife and fish species in the PFO area reflect the diversity of the area. Table 3-13 presents the important habitats and the representative species that depend on them.

Table 3-13. Representative Habitats of Importance and Representative Species in the PFO

Habitat Type	Representative Species and Activities
Mixed Conifer	Blue grouse, ruff grouse, snowshoe hare, goshawk, big game Summer range
Aspen	Blue grouse, ruff grouse, sage grouse, goshawk, big game summer range, elk calving, high density of avian nesting species
Riparian	Support highest density and diversity of wildlife species, high forage production, wildlife movement corridor
Wetland	Sage grouse strutting and breeding, waterfowl, high forage production
Mountain Shrub	Transition range for big game species between summer and winter range, mule deer fawning habitat
Pinyon-Juniper Woodland, and Sagebrush	Big game winter range, sage grouse nesting, sage grouse winter range
Desert Shrub	Whitetail prairie dog, burrowing owls, pronghorn
Cliff, Rim Rock, Talus	Falcon, eagle, hawk, owl, swallow, swift, nesting habitat, bighorn sheep, mountain lion, bobcat denning sites, woodrat, bats

3.2.8.1 Fish

The Price River drainage and upper reaches on Green River tributaries support cool water fisheries in their upper reaches at higher elevations and a warm water species assemblage in their lower reaches at lower elevations (Map 3-7). UDWR management of the fisheries is related to thermal and sediment conditions, in-stream habitat, and non-native species interactions. Areas with limited or constrained riparian areas typically exhibit warmer water temperatures, less stream stability, and increased numbers of non-native fish.

The PFO has several existing and potential cold water fisheries. Existing cold water fisheries include the upper Price River, upper Gordon Creek, Range Creek, Rock Creek, and Huntington Creek. Each of these waters currently supports rainbow, cutthroat, or brown trout fisheries. Potential cold water fisheries include lower Gordon Creek, Nine Mile Creek, Lower Range Creek, Jack Canyon Creek, Dry Canyon Creek, and Flat Canyon Creek.

In 2000, Governor Michael Leavitt and UDWR established the Blue Ribbon Fisheries Advisory Council. The mission of the council is to identify and recommend to the Director of UDWR those Utah waters that provide or have the potential to provide blue-ribbon-quality public angling experiences for the purpose of preserving and enhancing these valuable economic and natural resources. Waters identified as Blue Ribbon Fisheries in the PFO include Scofield Reservoir, Huntington Creeks, and Fish Creek below Scofield through the confluence with the White River, forming the Price River, downstream to Royal.

Notable warm water fisheries occur in the Green River, Nine Mile Creek, lower Price River, and San Rafael River. Representative cold and warm water fish species occupying habitats in the PFO are identified in Table 3-14. Approximately 20 species of fish are present in the drainage. Forty percent of these are native, with the remainder classified as exotic (non-native) species, which have been introduced directly or indirectly by humans.

Almost all waters in the PFO are managed by UDWR as wild fisheries, being maintained by natural recruitment rather than stocking. Private ponds near BLM land may be independently stocked, which may introduce diseases or undesirable fish species. Many exotic species have been introduced as sport fish and are considered game species. They include rainbow, brown, and Yellowstone cutthroat trout; channel catfish; black bullhead; and green sunfish. Other exotic fish species have been introduced illegally as bait fish. They include the Utah chub, fathead minnow, red shiner, redbase shiner, sand shiner, and common carp.

Table 3-14. Fish Species in the PFO

Species	Origin	Status
Colorado Pikeminnow, <i>Ptychocheilus lucius</i>	Native	Nongame, Endangered Species
Bluehead Sucker, <i>Catostomas discobolus</i>	Native	Nongame, Sensitive Species
Flannelmouth Sucker, <i>Catostomas latipinnis</i>	Native	Nongame, Sensitive Species
Roundtail Chub, <i>Gila robusta</i>	Native	Nongame, Sensitive Species
Humpback Chub, <i>Gila cypha</i>	Native	Nongame, Federally Endangered
Bonytail Chub, <i>Gila elegans</i>	Native	Nongame, Federally Endangered
Razorback Sucker, <i>Xyrauchen texanus</i>	Native	Nongame, Federally Endangered
Colorado River Cutthroat, <i>Oncorhynchus clarki pleuriticus</i>	Native	Game, Sensitive Species
Mottled Sculpin, <i>Cottus bairdi</i>	Native	Nongame
Mountain Sucker, <i>Catostomus platyrhynchus</i>	Native	Nongame
Speckled Dace, <i>Rhinichthys osculus</i>	Native	Nongame
Black Bullhead, <i>Ameiurus melas</i>	Exotic	Game
Common Carp, <i>Cyprinus carpio</i>	Exotic	Nongame
Fathead Minnow, <i>Pimephales promelas</i>	Exotic	Nongame
Red Shiner, <i>Cyprinella lutrensis</i>	Exotic	Nongame
Redside Shiner, <i>Richardsonius balteatus</i>	Exotic	Nongame
Sand Shiner, <i>Nortopsis stramineus</i>	Exotic	Nongame
Utah Chub, <i>Gila atraria</i>	Exotic	Nongame
Brown Trout, <i>Salmo trutta</i>	Exotic	Game
Channel Catfish, <i>Ictalurus punctatus</i>	Exotic	Game
Green Sunfish, <i>Lepomis cyanellus</i>	Exotic	Game
Rainbow Trout, <i>Oncorhynchus mykiss</i>	Exotic	Game
Yellowstone Cutthroat, <i>Oncorhynchus clarki bouvieri</i>	Exotic	Game

Source: Draft Aquatic Management Plan, Price River Drainage, 2001–2010, Louis N. Berg, Regional Aquatic Program Manager, Utah Division of Wildlife Resources, Salt Lake City, UT, February 2001.

3.2.8.2 Wildlife

The PFO contains a variety of habitats that possess the biological and physical attributes important in the life cycles of many wildlife species. Populations of mule deer, pronghorn, elk, desert bighorn sheep, Rocky Mountain bighorn sheep, mountain lion, black bear, bobcat, turkey, chukar partridge, sage-grouse, blue grouse, ruff grouse, California quail, waterfowl, and non-game species such as coyote, blacktail jackrabbit, whitetail prairie dog, and cottontail rabbit are found in the PFO. Wildlife of special interest includes big game animals, raptors, upland game birds, and other species that serve as indicators of ecosystem health.

Big game populations are managed based on habitat condition and the quality of the animals being produced in each herd unit. Population levels are linked to a variety of factors including vegetation quality and quantity; adequate space, shelter, and cover; water distribution; and regional weather patterns and trends such as prolonged drought.

Through cooperative transplants from other states and areas in Utah, introduction of elk, pronghorn, moose, chukar, and turkey have historically occurred on lands within or adjacent to the PFO. UDWR formally coordinates these activities with BLM and other public and private entities on a case-by-case basis. Certain management activities may be augmented with cooperative efforts with non-profit conservation groups.

The BLM PFO manages habitats for UDWR pronghorn, mule deer, bighorn sheep, and elk herd units. Table 3-15 lists UDWR population objectives and current estimated population levels for these species by herd unit. Map 3-8 shows UDWR Wildlife Management Units. The following herd units are found in the PFO area.

Pronghorn

Habitat Requirements—Pronghorn are considered to be yearlong residents of their range and do not have seasonal ranges like mule deer and elk. Even so, some seasonal movements within their range occur in response to extreme winter conditions, water availability, etc. Pronghorn prefer very open vegetative types such as salt desert shrub, grassland, and other treeless types and avoid areas of steep slopes. Pronghorn diets comprise a variety of forbs, shrubs, and grasses. Forbs are of particular importance during spring and summer while shrubs are more important during the winter. Pronghorn fawning occurs throughout the range of this species. (Map 3-9)

Distribution Within PFO—There are three management units that contain pronghorn habitat within the PFO (Nine Mile, San Rafael, and Manti). Both the Nine Mile and San Rafael units are occupied. The Manti unit has been identified within the PFO as potential or historic range and is currently not occupied by pronghorn. All pronghorn were extirpated from the PFO by the early 1900s. Pronghorn were reestablished by reintroduction into the San Rafael unit through cooperative agreement between BLM and UDWR beginning in the 1970–80s. Rocky Mountain bighorn sheep were reestablished by reintroduction into the Nine Mile unit through cooperative agreement between BLM and UDWR beginning in the 1990s. Portions of the Nine Mile bighorn sheep unit are still unoccupied by bighorn and may require additional transplants to return bighorn to their entire historic habitat in that unit.

Population Trend—Pronghorn populations are near or just below population objectives, Table 3-15. (It should be pointed out that some areas of unoccupied habitat remain in the Manti unit and population objectives may be adjusted in the future to allow for reestablishing pronghorn west of highway 10 in the Manti unit.)

Habitat Condition—Habitat conditions on pronghorn range are highly variable. Several years of drought have reduced forage production, caused mortality of some vegetative species.

Mule Deer

Two UDWR mule deer units occur in the PFO area. The mule deer are migratory, with the PFO area providing summer and winter range. Mule deer fawning habitat occurs primarily in the mountain browse vegetation zone. Presently, no chronic wasting disease (CWD) or other debilitating illnesses are known to be affecting the two herd units. However, a confirmed case of CWD was documented in 2003 the Vernal area, north of the PFO. In big game herds where CWD is prevalent, the disease can affect up to 1 to 3 percent of the population. Prolonged drought and other factors are likely limiting population numbers, particularly in the Nine Mile Range Creek unit (Map 3-10). Concern has recently been raised about the potential for CWD affecting mule deer and elk herds in Utah. Presently, UDWR is monitoring the herds for evidence of this disease in the herd units associated with the PFO.

Habitat Requirements—Mule deer throughout most of the PFO are migratory and move seasonally between summer and winter ranges. They summer at higher elevation ranges in aspen and conifer and mountain browse vegetative types where they are more or less evenly distributed. While on the summer range, mule deer diets are primarily composed of forbs and shrubs but will use some grass. Mule deer winter at the lower elevation ranges occupying the sagebrush and pinion-juniper vegetation types. Mule deer diets in PFO consist almost exclusively of sagebrush, primarily Wyoming sagebrush. Other shrubs such as true mountain mahogany, fourwing saltbush, and antelope bitterbrush are also important winter forage species. Pinyon-juniper is considered an important emergency forage during severe winters with deep snow conditions that cover other forage species. Mule deer have a high degree of fidelity to specific winter ranges where they concentrate on relatively small areas at high population densities. Because of the relatively small winter range area, high population densities, and the natural stress of winter survival, mule deer are vulnerable to added stress caused by human activity. Mule deer are known to be displaced an average of 600 feet from areas of human activity. Mule deer fawn during the spring on their movement back to their summer range. This usually occurs in aspen-mountain browse intermixed vegetation types.

CWD is a debilitating disease known to affect and cause mortality in mule deer and elk. Colorado and Wyoming have had significant outbreaks of CWD in some of their deer herds. Utah is currently testing big game for evidence that this disease is present in Utah. Isolated confirmations of CWD have been verified in deer management units north, south, and east of the PFO. To date, no cases of CWD have been confirmed in deer management units within the PFO.

Distribution Within PFO—There are five management units for mule deer within the PFO. The Nine Mile, Manti, and Wasatch Mountain units have migratory herds with moderate-to-high densities of mule deer while the San Rafael and Plateau units are resident herds and very low densities of mule deer.

Population Trend—All mule deer herds within the PFO have undergone declines in population size during the late 1980s and early 1990s. These declines were attributed primarily to severe drought conditions, which substantially reduced animal condition and fawn production and survival. Population levels in the Manti and Wasatch Mountains units have increased substantially over the last 5 years while the Nine Mile unit has improved only marginally.

Habitat Condition—Habitats on both summer and winter ranges in the Nine Mile unit are considered to be in good condition and are not believed to be limiting mule deer populations. Habitats on the summer range in the Manti unit are also considered to be in good condition and not limiting mule deer population. Habitats on winter ranges in the Manti unit are in extremely poor condition. In 2003, these winter ranges

experienced a 50 percent or greater mortality of sage brush on an estimated 130,000 acres. This is expected to limit mule deer populations and likely result in population declines in the Manti Unit. In addition, CBNG development (600 + wells and infrastructure) has taken place on the winter ranges of the Manti unit over the last 7 years and has reduced habitat suitability and carrying capacity for this herd unit.

Off-site mitigation at the rate of one acre of habitat enhancement for each acre of surface disturbance has been used in the PFO since 1983, to help offset surface disturbance impacts to crucially valued wildlife habitats (e.g., big game crucial winter range).

Special Management Areas—The Utah DWR manages the Gordon Creek Wildlife Management area for big game winter range west of the City of Price in the Manti Management Unit. In conjunction with the Division of Wildlife Resource, BLM manages mineral sub-surface of these lands and livestock grazing on adjoining BLM lands to specifically benefit wildlife and preserve the security of this important winter range.

Bighorn Sheep

Habitat Requirements—Rocky Mountain and desert bighorn sheep are considered to be yearlong residents of their range and do not have seasonal ranges like mule deer and elk (Map 3-11). Even so some seasonal movements within their range occur such as ewes move to reliable watercourses or sources during the lambing season. Bighorn sheep prefer very open vegetation types such as low shrub, grassland, and other treeless types typically associated with steep talus and rubble slopes. Bighorn diets comprise a variety of shrubs forbs and grasses. Bighorn sheep lambing occurs on steep talus slopes typically within 1–2 miles of reliable water sources.

Both species of bighorn sheep are extremely vulnerable to a variety of viral and bacterial diseases carried by livestock, principally domestic sheep. In some cases reported in the literature, exposures of some of these diseases have caused decimation of entire bighorn populations. These diseases are transmitted in a number of ways including nose-to-nose contact and wet soils associated with areas of concentrated use such as stock watering ponds. For these reasons BLM has adopted specific guidelines regarding domestic sheep grazing in or near bighorn sheep habitat.

Distribution Within PFO—There are two management units occupied by bighorn sheep within the PFO (Nine Mile and San Rafael). Both Rocky Mountain and desert bighorn sheep were extirpated from the PFO by the early 1920s. Desert bighorn sheep were reestablished by reintroduction into the San Rafael unit through cooperative agreement between BLM and UDWR beginning in the 1970–80s. Rocky Mountain bighorn sheep were reestablished by reintroduction into the Nine Mile unit through cooperative agreement between BLM and UDWR beginning in the 1990s. Portions of the Nine Mile bighorn sheep unit are still unoccupied by bighorn and may require additional transplants to return bighorn to their entire historic habitat in that unit.

Population Trend—Both species of bighorn sheep have been very successful in reoccupying historic habitat. Numbers of desert bighorn sheep are near population objectives for the San Rafael unit (Table 3-15). Numbers of Rocky Mountain bighorn are approaching population objectives for the Nine Mile unit, Table 3-15. (It should be pointed out that some areas of unoccupied habitat remain in the Nine Mile unit and population objectives may be adjusted in the future to allow for reestablishing bighorn in these historic ranges.)

Habitat Condition—Habitats on both summer and winter range in the Nine Mile units are considered to be in good condition and are not believed to be limiting elk populations. Habitats on the summer range in

the Manti unit are also considered to be in good condition. Habitats on lower winter ranges in the Manti unit are in poor condition (see description in mule deer narrative).

Special Management Areas—Gray Canyon Wildland Management area was established by land use planning decision in June 1989 for the express purpose of enhancing wildland values including recreation, riparian, and wildlife, notably bighorn sheep. All forage within this large geographic area was allocated to wildlife. This significant decision was made possible as a result of several non-profit sportsman and environmental groups working with the UDWR to retire domestic livestock permits and coordinate their efforts with the PFO.

Elk

Two UDWR elk units occur within the PFO area (Map 3-12). Both herds were established through transplants from other states. The Manti herd was begun with Yellowstone area elk in the 1920s. The Nine Mile Range Creek herd was established in the 1980s. Elk are migratory, with the PFO area providing primarily winter range for the Manti herd and summer and winter range for the Nine Mile Range Creek herd. Elk calving occurs primarily in the aspen-sagebrush parkland vegetation and habitat zones.

Habitat Requirements—Rocky Mountain elk throughout most of the PFO are migratory and move seasonally between summer and winter ranges. They summer at higher elevation ranges in aspen and conifer and mountain browse vegetation types where they are more or less evenly distributed. While on the summer range, elk diets consist primarily of grasses and forbs. Elk winter at mid-to-lower elevation ranges occupying the mountain browse, sagebrush, and pinion-juniper vegetation types. Wind-swept higher ridges in some areas, such as the high ridge tops of Castle Valley Ridge, above Price Canyon, and along some areas of the Bookcliffs, are extremely important for this species.

Elk exhibit a high degree of mobility on both summer and winter ranges to seek out habitats that provide the best forage conditions. On winter ranges, elk congregate into large herds of 50 to more than 200. Because of this congregation in large herds and the natural stress of winter survival, elk are vulnerable to added stress caused by human activity. Elk are known to be displaced from .5 miles to 1 mile from areas of human activity. Elk calving occurs during late spring and early summer in aspen-mountain browse intermixed vegetation types.

See Description of Chronic Wasting Disease for Mule Deer

Distribution Within PFO—There are three management units for elk within the PFO (Nine Mile, Manti, and Wasatch Mountain). Small, localized populations of elk are also found in the San Rafael unit (Cedar Mountain). Elk within the PFO were extirpated by the early 1900s. Elk in all three of the management units were reestablished by reintroduction. The Manti unit was reestablished from transplants dating back to the early 1900s. Elk within the Nine Mile unit were reestablished through cooperative agreement between BLM and UDWR in the 1980s.

Population Trend—Elk herds within the PFO average near or above population objectives as set by UDWR. As shown in Table 3-15, the Manti and Wasatch Mountain units are very near or at population objective while in the Nine Mile unit elk populations are above the population objective. UDWR is currently using antlerless hunt strategies to maintain population levels near the population objectives for each unit.

Habitat Condition—Habitats on both summer and winter range in the Nine Mile units are considered to be in good condition and are not believed to be limiting elk populations. Habitats on the summer range in

the Manti unit are also considered to be in good condition. Habitats on lower winter ranges in the Manti unit are in poor condition (see description in mule deer narrative).

Special Management Areas—See description under mule deer for Gordon Creek WMA.

Moose

UDWR has not established specific herd units or designated a hunting season for moose in the PFO. Moose were transplanted into adjacent habitats several years ago by UDWR. Approximately 20 to 30 moose have migrated into higher elevation, wet meadow habitats located in the PFO-managed land on the West Tavaputs Plateau.

Black Bear

The black bear, *Ursus americanus*, is native to Utah. The species is fairly common in Utah and is present in Carbon and Emery counties, where it can be found primarily in large forested areas. Contrary to its name, the black bear is not always black; the species varies in color from reddish to light brown to black. Black bears are omnivores with diets consisting of fruits, insects, grubs, some small vertebrates, and carrion. They breed in June or July, and young are born in January or February; average litter size is two. Young stay with their mother until the fall of their second year. Black bears are nocturnal and are dormant during the winter. The black bear is currently the only species of bear that occurs naturally in Utah.

Cougar (Mountain Lion)

In the PFO, cougars are found in areas where prey species, especially mule deer, are present. The species is still fairly common throughout Utah, but individuals are rarely seen because of their secretive nature. Females may produce one litter of one to six kittens about every 2 years. Cougars are active year-round, during day and night, although most activity occurs at dawn and dusk. Cougars are carnivores, with diets composed of deer, rabbits, rodents, and other animals. They are hunted on a limited, and closely monitored, basis in Utah.

In addition to herd units, the PFO provides habitat for the following.

Upland Game Birds and Waterfowl

The PFO provides important migration, nesting, and winter habitats for waterfowl. Sage-grouse breeding and forage habitats have been located in the PFO (Map 3-13). Chukar habitats occur along the river corridors and the talus slopes. Sage-grouse exist on state, private, and BLM lands in the Emma Park, Whitmore Park, Range Creek, and Gordon Creek areas. Sage-grouse were reintroduced in the Gordon Creek area in 2002. Sage-grouse are not hunted in the PFO. Additional upland game bird species include blue grouse and ruffed grouse.

General habitat conditions (excellent, good, fair, and poor) for habitats used by high-interest big game species located in the PFO have been summarized in Table 3-15. These general characterizations reflect vegetation resource condition, habitat quality relative to fragmentation or density of intrusions, and level of conflicts with competing resource issues or as indicated by population level. Applicable elements are footnoted for each condition class.

Table 3-15. Habitat Conditions for Big Game Animals in the PFO

Species	Herd Unit	Critical Winter Range	High-Value Winter Range	Summer Range	Calving, Fawning, and Lambing Habitat	Yearlong Range	UDWR Population Objective	UDWR Current Population Estimate
Mule Deer	Nine Mile Range Creek	Good ¹	Good ¹	Fair ³⁻⁴	Fair ³⁻⁴	NA	6,000	2,350
	Manti	Poor ²	Poor ²	Fair ¹	Good ¹	NA	38,000	26,500
Elk	Range Creek	Good ¹	Good ¹	Good ¹	Good ¹	NA	1,000	1,775
	Manti	Poor ²	Poor ²	Good ¹	Good ¹	NA	12,000	10,900
Pronghorn	San Rafael	NA	NA	NA	Good ¹	Good ¹	Not Established	900
Rocky Mtn. Bighorn	Nine Mile Range Creek	NA	NA	NA	Excellent ¹	Excellent ¹	300	250
Desert Bighorn	North San Rafael	NA	NA	NA	Excellent ¹	Excellent ¹	500	400
	South San Rafael	NA	NA	NA	Excellent ¹	Excellent ¹	500	400
	San Rafael/Dirty Devil	NA	NA	NA				

Notes:

¹ Vegetation resource condition.² Energy development/density of intrusions.³ Competition with other resources.⁴ As reflected by population levels.

3.2.9 Wild Horses and Burros

The PFO includes four Herd Management Areas (HMA) in the PFO: Range Creek, Muddy Creek, Sinbad, and Robbers Roost. The Appropriate Management Level (AML) for each HMA is shown in Table 3-16.

Table 3-16. AML and Current Estimated Populations

HMA	AML		Current Estimated Population	
	Horses	Burros	Horses	Burros
Range Creek	75–125	0	106	0
Muddy Creek	30–50	0	43	0
Sinbad	30–50	30–70	40	69
Robbers Roost	15–25	0	17	0
Total	150–250	30–70	206	69

Herd population management is critical in balancing herd numbers, with forage resources. Wild horses have been shown to be capable of 18 to 25 percent increases in numbers annually. This can result in a doubling of the wild horse population about every 3 years (BLM, 2000c). This regular increase in population affects the condition of the range within an HMA, which results in greater competition for resources between wild horses and cattle or wildlife, specifically elk with horses and bighorn sheep with burros. Populations are currently maintained within the AML through wild horse and burro gathers. These gathers are performed as necessary, with an average frequency of one gather for each HMA every 3 to 4 years. Extenuating circumstances such as drought, high reproduction rates, and poor range condition may alter the frequency of gathers. Gathered horses are either placed for adoption through the Wild Horse and Burro Adoption Program or are placed in long-term holding facilities.

Although there have been data gaps in the past (BLM, 1991a), data is now obtained from gathered horses and burros. In relation to this data, IM 2002-95 requires that the following data be collected:

- Population demographics (age structure and sex ratio)
- Herd characteristics (color, size, and type)
- Reproduction and survival rates
- Herd health (parasite loading and physical condition)
- Herd history and genetic profile (blood and hair sampling)
- Condition class (Henneke System)
- Immuno-contraception data, if applicable.

BLM is currently researching the use of immuno-contraceptives to slow the reproductive rate of wild horses and burros. Although still considered experimental, immuno-contraceptives are used extensively throughout the BLM areas. This method of population control has been used on horses in the Muddy Creek HMA.

Current HMA boundaries (see Map 2-6 of Chapter 2 and Table 3-17) do not accurately represent the areas used by wild horses and burros. In several areas, boundaries can be realigned to follow natural landmarks and barriers. Such realignment will enable more efficient management of wild horses and burros, as well as other resources uses currently within portions of HMA boundaries that wild horses and burros do not use.

Table 3-17. HA/HMA Acreages

HA/HMA Acreage	Range Creek	Sinbad	Muddy Creek	Robbers Roost
BLM	54,630	203,767	168,854	150,755
State	5,636	25,973	21,879	19,151
Private	18,375	858	0	0
Total	78,641	230,598	190,733	169,906

Constraints and threats to wild horse and burro management include the following:

- Competition between bighorn sheep and burros
- Competition between elk and horses
- HMAs in which critical soils make up more than 50 percent of the area
- Competitive use between livestock (cattle and sheep) and wild horses or burros
- Illegal chasing, capturing, and harassment of wild horses and burros.

3.2.10 Fire and Fuels Management

The Moab Field Office has fire protection and fire management responsibilities for all BLM-administered lands in Carbon, Emery, Grand, and San Juan counties. All fire suppression, fire dispatching, fire prevention, and other fire-related responsibilities are retained administratively within the district. The Moab Field Office will seek fire suppression assistance from, and provide assistance as needed to other BLM field offices, USFS, National Park Service (NPS), Bureau of Indian Affairs, and the State of Utah. Guidelines for this cooperation are identified in the Southern Utah Annual Fire Operating Plan. A key element of that plan is the concept of initial attack by the closest force. This situation results in frequent crossing of administrative boundaries for the purpose of making an initial attack on a wildfire. In 1992, the Moab Field Office entered into agreements with the Manti-LaSal National Forest and the State of Utah to combine fire dispatch offices.

To identify the fire workload and determine the organization needed to meet management objectives, the district is divided into various sized polygons based on fuel types. The Fire Management Zone (FMZ), a fire management division of areas with similar fuel and fire behavior, and representative locations, areas within the FMZ that represent a typical fire response, were established to ensure appropriate fire management direction and desired resource condition. For reference purposes, Table 3-18 lists the PFO fire management areas for the PFO are listed in Table 3-18.

Table 3-18. Fire Management Areas

Fire Management Area	Category	FMZs	Representative Locations	Acres
Price Bench Chaining	B	1	5	180,000
San Rafael Swell-Cedar Mountain	C	1	5	620,000
Gordon Creek Winter Range	B	1	5	30,000
Emma Park and Wattis Benches	B	1	5	320,000
Highway 6 & and 10 Corridor	A	2	3	143,000
Riparian Area-Price Area	A	2	3	300,000
Woodside-San Rafael Desert	C	2	3	1,500,000
Range Creek Complex	A	3	2	19,000
East Range Creek	B	3	2	145,000
Turtle Canyon and Rock Creek	C	3	2	80,000
Bruin Point	A	3	2	165,000
Beckwith Plateau	D	3	2	75,000

Note: Acreage includes all private and state land blocks and is rounded for simplicity. *Source:* BLM, 1998.

3.2.10.1 Fire Categories

The four fire categories are as follows:

- Category A—Wildland fire is not desired at all.
- Category B—Wildfire is likely to cause negative effects, but these effects may be mitigated.
- Category C—Fire is desired, but there are constraints.
- Category D—Fire is desired, and there are no constraints or areas where fire will not normally burn.

3.2.10.2 Fire Management Zones

The three FMZs are discussed in the following paragraphs.

Fire Management Zone 1

FMZ 1 is vegetated primarily by pinyon/juniper, with scattered pockets of grass and sage and some ponderosa pine, representing the mid-elevation areas of the district. The terrain is generally mesas and benches.

Fire Management Zone 2

FMZ 2 is vegetated primarily by grass and sage. This area includes the lower elevations of the district, including the valley floors and riparian areas. Cheat grass is a fuel type, but other grasses, such as crested wheat, thrive in some areas.

Fire Management Zone 3

FMZ 3 is the high country of the Book and Roan Cliffs on the northern end of the district. Douglas-fir is predominant in the higher elevations and north slopes, with a good portion suffering from bug kill. Mountain brush and gamble oak occurs on some of the south slopes, and pinyon/juniper occurs in lower parts of the zone in open and closed stands.

3.2.10.3 Representative Locations

The three representative locations are discussed as follows.

Representative Location 5

Representative Location 5 is the general pinyon/juniper country near Price. It covers the Price Bench chaining area, San Rafael-Cedar Mountain, Gordon Creek, Wattis Benches, and Emma Park polygons. Approximately eight fires occur each year, the largest being the 1996 East Carbon fire that burned 1,000 acres in an old chaining. There are numerous private land holdings that must be protected along with the National Forest boundary on the west. The private land holdings are a predominate factor, and sufficient fire forces are needed to ensure adequate protection along with having enough suppression forces to conduct larger burns.

Representative Location 3

Representative Location 3 includes the valley areas in Carbon and Emery counties. It includes the Woodside and San Rafael Desert polygons and the Green River, Price River, San Rafael River, Muddy River, and Nine Mile riparian polygons. The Highway 6 and 10 Corridor polygon is also included. The

town of Price and all the small surrounding communities are included in this representative location. One key area is the Price Canyon highway corridor that includes the Price Canyon Recreation Area. On average, approximately about five fires occur each year. The largest fire that has occurred in this area was the Price Canyon fire in 2002 that burned 3,269 acres along the Price River to the top of Sulphur Canyon. With the exception of the Price Canyon fire, fires rarely exceed consume more than 300 acres. Grass and sage are generally found in scattered pockets. This area rarely has a reportable fire. The Green River Corridor occasionally has a significant fire in tamarisk.

Representative Location 2

Representative Location 2 covers the Roan Cliffs and Tavaputs plateau, spreading westward from the Green River through high country. It includes the Bruin Point, Rock Creek, Range Creek, East Range Creek, Turtle Canyon, and Beckwith Plateau polygons. This location includes some of the most rugged country in the PFO. A large portion of the representative location is privately owned. The Bruin Point communications site is located here. Approximately About three fires occur each year in this location, the largest being the 2000 Bruin Point fire that burned 1,981 acres of mixed conifer. Beckwith Plateau has very little fuel and almost no fire occurrence. The private land along the top of Range Creek is a major fire protection concern.

3.2.10.4 Prescribed Burn Program

The Moab Fire District directs the prescribed burn program for the PFO, which has averaged one prescribed burn every 2 years for the last 20 years. A limited amount of prescribed burning has been accomplished due to lack of funds. Mechanical treatments have been minimal.

3.2.11 Non-WSA Lands with or Likely to Have Wilderness Characteristics

Since the WSAs were established in the 1980s, Utah wilderness allocations and decisions have become prominent national issues. For more than 20 years, the public has debated which lands have wilderness characteristics, and should be considered by Congress for wilderness designation. As a result of the debate (and a significant passage of time since BLM's original inventories), in 1996 the Department of the Interior (DOI) directed BLM to take another look at some of the lands in question. In response to this direction, BLM inventoried these lands and found approximately 2.6 million acres of public land statewide (outside of existing WSAs) to have wilderness characteristics (*1999 Utah Wilderness Inventory*). Refer to "Wilderness Characteristics" in the glossary.

In April 2003, the U. S. District Court, District of Utah, Central District, approved an agreement negotiated to settle a lawsuit originally brought in 1996 by the State of Utah, Utah School and Institutional Trust Land Administration, and the Utah Association of counties, challenging BLM's authority to conduct new wilderness inventories. The settlement stipulated that BLM's authority to designate new WSAs expired no later than October 21, 1993. BLM, however, does have the authority to conduct inventories for characteristics associated with the concept of wilderness, and to consider management of these values in its land use planning process. IM 2003-275 - Change 1 identifies wilderness characteristics that may be considered in land use planning as naturalness and outstanding opportunities for solitude or primitive recreation – refer to "Wilderness Characteristics" in the glossary.

Non-WSA lands likely to have wilderness characteristics are lands that were identified by the public for consideration in this planning process. The BLM interdisciplinary planning team considered the

information presented on the suggested wilderness characteristics of these areas, and determined that some of these areas were likely to have wilderness characteristics. At this time however, no inventory has been completed by the BLM to confirm the presence of wilderness characteristics, and no public review of the suggested values of these areas has taken place. Because BLM believes it is likely some of these areas have wilderness characteristics, they are being considered in this plan.

There are 14 areas in the PFO outside of existing WSAs, totaling about 483,121 acres, that were determined by BLM in the 1999 inventory to have the wilderness characteristics of naturalness and outstanding opportunities for solitude or primitive recreation (see Table 3-19 and Map 3-14).

Table 3-19. Non-WSA Lands With Wilderness Characteristics in the PFO

Area Name	Acres
Cedar Mountain	14,984
Desolation Canyon	86,453
Devils Canyon	10,895
Hondu Country	20,104
Jack Canyon	3,331
Labyrinth Canyon	26,170
Mexican Mountain	40,911
Muddy Creek–Crack Canyon	125,709
Mussentuchit Badlands	24,283
San Rafael Reef	45,868
Sids Mountain	35,075
Turtle Canyon	4,861
Upper Muddy Creek	17,852
Wild Horse Mesa	26,625
Total (14 areas)	483,121

During scoping for this land use plan, members of the public submitted information suggesting that nine additional areas outside of existing WSAs have wilderness characteristics and should be managed to preserve those values. A BLM interdisciplinary team evaluated this and other information and determined that all or portions of these areas, totaling about 471,585 acres, are likely to have wilderness characteristics including naturalness and outstanding opportunities for solitude or primitive recreation (see Table 3-20 and Map 3-14)."

Table 3-20. Non-WSA Lands Likely to Have Wilderness Characteristics

Area Name	Acres
Eagle Canyon	38,000
Flat Tops	33,729
Lost Spring	37,000
Molen Reef	33,000
Price River	100,900
Rock Canyon	19,081
San Rafael River	101,000
Sweetwater Reef	79,510
Wild Horse Mesa	29,635
Total (9 areas)	471,855

3.3 RESOURCE USES

3.3.1 Forest and Woodlands

There are approximately roughly 70,000 acres of forest and 650,000 acres of woodland (mostly pinyon/juniper) in the PFO. A detailed inventory of PFO forest resources is incomplete, but a previous inventory conducted by the State of Utah, Division of Forestry and Fire Control, from 1971 to 1974 can be used for general reference. Forested land in the PFO is primarily pinyon/juniper (*Pinus edulis* and *Juniperus osteosperma*) woodland. The bulk of pinyon/juniper occurs in elevations from 4,500 to 7,500 feet in elevation. Distribution of the species is largely determined by precipitation patterns. Small areas of other species also occur in the PFO. Douglas-fir (*Pseudotsuga menziesii*) and spruce (*Picea engelmannii* and) (*Picea pungens*) are found at higher elevations of the PFO. There are approximately 30,000 acres of Douglas-fir in the northern portion of the PFO. Very limited amounts of ponderosa pine (*Pinus ponderosa*) can be found in transitional elevations in drainages and along ridges. There are also small pockets of white fir (*Abies concolor*), oak (*Quercus spp*), cottonwood (*Populus spp*), box elder (*Acer negundo*), river birch (*Betula nigra*), quaking aspen (*Populus tremuloides*), ash (*Fraxinus nigra*), willow (*Salix exigua*), tamarisk (*tamarix ramosissima*), and other broadleaf species.

Current forest and woodland management is limited to permit sales for noncommercial harvest and occasional hazardous fuels reduction projects conducted by BLM fire management. Interest in commercial timber production is low.

The highest demand for forest products is fuelwood and Christmas trees. There is also limited demand for juniper fence posts. An additional use of forest resources within the PFO is vegetative harvest for grass and seeds. Pinyon nuts and grass seeds are the vegetative products in highest demand and with the widest distribution in the PFO.

There may be a growing demand for timber harvest of Douglas-fir, spruce, fir, and aspen. The PFO is receiving increasing numbers of requests for commercial cutting of spruce and Douglas-fir. Forest tracts in the area of the Tavaputs Plateau, Range Creek, and Roan Cliffs may have some harvestable timber stands. Many of these areas are landlocked by private and state lands where timber harvests are ongoing.

Demand for commercial harvest on public lands managed by BLM may be linked to the harvest of adjacent areas. However, BLM's ability to access, inventory, and manage these public lands is limited by surrounding private access. The PFO must receive permission to use private roads and gates to enter most of the potential timber areas. The ability to manage active timber harvest in these areas would be extremely limited. The PFO is aware that trespass timber harvests may have occurred in portions of the harvestable stands. Although the amount of trespass has been limited to date, without the development of new management prescriptions in this RMP, it is anticipated that trespass would increase.

Current timber harvests on private lands are having the effect of selective cutting within the larger mixed ownership stands. This practice is resulting in improper overall management that leaves stands vulnerable to wildfire and disease. In addition, fuel reduction projects accomplished by timber harvest on private land or by the BLM fire program are not following Healthy Forest Initiative guidelines and are not being planned for within a forest management program.

The forest resources in the PFO may not meet criteria for sustained yield. Sustained yield means that the achievement and maintenance in perpetuity of a high-level annual or regular periodic output of the various renewable resources of the public lands is consistent with multiple use (Federal Land Policy and Management Act [FLPMA] 43 CFR 1702). Detailed forest and stand inventories have not been completed to determine the extent and nature of existing timber resources. Many of the forest and woodland areas in

the PFO are located on steep slopes or within WSAs, primitive recreational opportunity spectrum (ROS) classes, or Special Recreation Management Areas (SRMA).

3.3.2 Livestock Grazing

Grazing in the PFO is managed according to the Utah Rangeland Health Standards and Guidelines, based on historical use and dependent on the availability of forage and water. All grazing areas are open for livestock grazing, with the exception of Gray Canyon Wildland Area, Gordon Creek Wildlife Area, and Wildlife Allotment, which is closed to grazing due to its aesthetic and recreation values. Interoffice agreements between the Price and Richfield Field Offices, Price and Vernal Field Offices, and Price and Salt Lake Field Offices relating to vegetation allocation for grazing management, outlines which grazing allotments will be administered by each field office.

All grazing allotments are assigned a management category based on evaluations for resource potential and conflicts. The three management categories are Maintain, Improve, or Custodial. (Map 3-15 shows grazing allotments in these categories.) These categories set the priorities for funding allocation, manpower for planning purposes and achieving management objectives, and monitoring plans. Based on priorities, the allotment monitoring plans sets the frequencies for completing monitoring studies. Table 3-21 lists the criteria for each of the management categories.

Table 3-21. Management Category Criteria

Category	Criteria
Maintain (M)	Resource production potential is moderate to high, and present production is near potential No serious resource-use conflicts exist Opportunities may exist for positive economic return from public investment
Improve (I)	Resource production potential is moderate to high, and present production is set at low to moderate levels Serious resource-use conflicts are present Opportunities may exist for positive economic return from public investment
Custodial (C)	Resource production potential is low, and present production is at low to moderate levels Limited resource-use conflicts are present Opportunities for positive economic return from public investment do not exist
Appendix G, San Rafael Resource Assessment, July 1989	

The PFO developed a vegetative monitoring plan to determine if whether current livestock management practices are meeting planning objectives and RHS. Throughout the PFO, livestock monitoring studies have been established on the M and I allotments and some C grazing allotments.

Monitoring studies on these grazing allotments identify key plant species. Key plant species selected are based on physical presence, ecological site potential, and management objectives and are used to detect changes in the vegetative communities. The PFO contains five general vegetative communities for monitoring studies: riparian areas, salt desert, sagebrush/grass; pinyon/juniper and mountain brush. Table 3-22 lists the typical key species associated with each vegetative community.

Table 3-22. Typical Key Species Associated with Vegetative Community

Vegetative Community	Key Plant Species
Riparian areas	Bluegrass, wheatgrass, rushes, sedges, cottonwood, and willow,
Salt desert	Indian ricegrass, galleta grass, squirreltail, shadscale, fourwing saltbush, and winterfat
Sagebrush/grass	Indian ricegrass, needle and thread grass, western wheatgrass, fourwing saltbush, and big sagebrush
Pinyon/juniper	Indian ricegrass, needle and thread grass, bluegrass, and antelope bitterbrush

Mountain brush	Bluegrass, needle and thread grass, snowberry, and mahogany
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The PFO established forage utilization levels to avoid over use of key plant species during the grazing use season. These levels may vary based on the ecological and vegetative communities within individual allotments and management prescriptions.

Rangeland Health Assessments have been completed on 66 livestock grazing allotments in the PFO. Table 3-23 shows the percent of acres functioning, functioning at risk, and non-functioning where Rangeland Health Assessments were completed by management category. In the Improve management category, 87 percent of the areas assessed are considered to be functioning and 12 percent are functioning at risk. Overall of the areas assessed, 90 percent are considered to be functioning and about 10 percent are functioning at risk. None of the areas where Rangeland Health Assessments were completed are considered non-functioning.

Table 3-23. Rangeland Health Assessments in the PFO

Management Category	Percent of Acres Functioning	Percent of Acres Functioning At Risk	Percent of Acres Non-Functioning
Improve	87.68%	12.32%	0
Maintain	99.25%	0.75%	0
Custodial	87.29%	12.71%	0
Total	90.44%	9.56%	0

The Rangeland Health Assessment data (Table 3-23) is used in the completion of individual allotment evaluations to analyze vegetation, soil, and habitat conditions. This information is then used to develop recommendations to maintain or improve rangeland health. Any livestock grazing adjustments are implemented through an agreement or by decision.

Authorized AUMs for licensed use, permitted use, and the percentage of use by livestock type between 1994 and 2003 are presented in Table 3-24. Licensed use for allotments addressed in this RMP are identified in Table 3-25. AUMs reduced since the last land use plans are listed in Table 3-26. Reasons for reductions in AUMs available for grazing included land use plan amendments, reductions due to vegetative and grazing monitoring, and loss of base property. The total Active AUMs reduced is 14,810 and the total number of suspended AUMs is 5,517.

Table 3-24. Authorized PFO AUM and Livestock Type

Year	Livestock Type and Permitted Use					
	Cattle	Horses	Sheep	Total	Permitted	Percentage of Use
2003	32,627	216	0	32,843	100,559	33
2002	42,218	182	94	42,494	100,625	42
2001	55,741	263	262	56,266	100,625	56
2000	41,168	235	215	41,618	100,840	41
1999	55,272	250	310	55,832	102,160	55
1998	50,461	201	604	51,266	102,891	50
1997	40,555	188	284	41,027	102,919	40
1996	31,628	238	262	32,128	105,815	30
1995	46,147	230	300	46,677	105,865	44
1994	40,193	211	1,294	41,698	111,411	37

Average	43,601	221	273	44,185	103,371	43
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Source: BLM Price Field Office.

The greatest demand for grazing resources on public lands is in the spring. Often there is a gap between the date stock must be moved from public lands and the date they can be taken onto USFS lands, and this increases the demand for spring grazing on public lands. Continuous spring grazing has caused some of the cool-season plant species to be replaced with warm-season species, which produce very little spring forage, thus reducing the spring grazing capacity of the range. This change, however, does not appear to have occurred area-wide. Average licensed use is currently being met in the grazing area, but forage capacity affords little margin for increase. An estimated 15 to 20 percent of this forage is unavailable to livestock due to inaccessibility and lack of stock water.

PFC studies indicate that under current management, rangelands are functioning or functioning at risk. Future demands may be met under these conditions. If conditions were non-functioning, future demands could still be met with the implementation of range treatments (i.e., chaining, seeding, applications of herbicide, prescribed fires, vegetation manipulation, etc.) and more intensive grazing systems (i.e., development of stock water areas, season of use changes, etc.). In allotments with the potential to respond to intensive management, grazing systems are manipulated to produce more livestock forage. Range improvements commonly include livestock guzzlers, fencing, wells, and livestock handling facilities.

Table 3-25. Licensed Use for Allotments Specifically Addressed in This RMP

Allotment Name	Season of Use ¹	Licensed Use by Grazing Year (GY)									
		GY02	GY01	GY00	GY99	GY98	GY97	GY96	GY95	GY94	GY93
Buckskin		0	95	95	0	95	95	95	95	74	54
Bunderson	Closed to grazing since loss of base in April 1992										
Case		0	0	0	0	0	0	0	0	0	0
Ferron Mills		91	0	91	91	91	60	91	91	91	91
Green River (total)		174	112	0	0	0	0	0	0	0	0
Green River (Horse Bench Pasture—Desolation SRMA only)		0	0	0	0	0	0	0	0	0	0
Hondo	11/1–5/31	81	12	97	170	0	0	0	0	0	0
Horse Bench ²		665	856	665	836	669	799	540	1,262	526	337
Horseshoe Canyon North ²		470	1,582	1,263	1,697	1,697	1,553	537	0	0	0
Little Valley ²		134	0	0	0	148	88	53	102	137	107
McKay Flat	11/1–3/15	395	388	54	253	0	405	58	126	362	370
Peterson	Closed to grazing since June 1976										
Price Canyon West		512	426	512	431	508	423	445	508	448	355
Price River South (in Desolation SRMA)	Last used in 1989, except to trail from Green River town to Range Creek.										
Range Creek		0	284	284	142	284	142	142	284	282	114
Red Canyon	10/16–3/15	783	883	107	1,424	997	791	825	616	861	653
Rim Rock	No use since loss of base in early 1980s										
Rock Creek (in Desolation SRMA)	3/1–2/28	0	61	64	70	103	94	24	59	34	80
San Rafael River ²		520	630	382	722	734	2,213	1,665	861	0	0
Saucer Basin ²		596	745	576	1,102	1,102	968	754	1,109	1,109	1,072
Trail use within Desolation SRMA		0	92	200	57	107	0	0	56	158	247
Wattis		0	0	40	50	49	48	50	49	0	0

¹ Shows only time periods for allotments that change in season of use in this RMP.

² All allotments in Labyrinth Canyon SRMA cannot be split out by use within the proposed SRMA.

Table 3-26. Changes in Livestock Grazing AUMs Since Previous Land Use Plans

Allotment	Initial		Reduction	
	Active AUMs	Suspended AUMs	Active AUMs Reduced	Suspended AUMs Reduced
Bighorn (34005)	650	340	650	340
Elliot Mountain (34042)	725	0	725	0
Pack Trail (24126)	698	233	698	233
River (24099)	600	400	600	400
Last Chance (34063)	400	210	400	210
Fuller Bottom (35023)	772	263	143	45
Iron Wash (35031)	4,985	0	417	0
Pinnacle Bench (34090)	333	107	74	0
Green River (34049)	8,584	5,416	5,546	3,633
Wattis (14118)	100	2	50	2
Georges Draw (25024)	998	0	292	0
Horseshoe Canyon South (15100)	2,025	0	2,025	0
Taylor Flat (25087)	2,028	0	579	0
Mesquite Wash (35044)	114	0	28	0
Dry Canyon (34038)	875	39	235	0
South Ferron (15080)	741	0	496	0
McKay Flat (35043)	2,288	129	1,014	129
Miller Canyon (35046)	498	189	306	154
Ferron Mills (35021)	121	29	31	11
Canal	8	0	8	0
Coal Creek (34027)	849	1,190	99	0
Coon Spring (34029)	384	84	116	0
Wildcat (14121)	70	0	35	0
Washboard (04115)	601	399	243	0
TOTALS	29,447	9,030	14,810	5,157

3.3.3 Recreation

World-class recreation resources are located in the PFO area. Recreation resources include areas for dispersed camping, hiking, horseback riding, OHV riding, scenic overlooks, hunting, fishing, boating, canyoneering, scientific and cultural resource study, wildlife viewing, and wild lands enjoyment. Travel and recreation guides, newspaper articles, and other publications recognize many areas of the PFO as desirable recreation destinations. Recreation activities take place in developed facilities, as well as in large undeveloped parts of the PFO.

3.3.3.1 Recreation Opportunity Spectrum

The Recreation Opportunity Spectrum (ROS) is a system of inventorying and classifying the range of recreation experiences, opportunities, and settings in the PFO. ROS classes were identified for the 1991 San Rafael RMP. The Price River MFP does not address ROS classification. ROS inventory for the Price River area was developed subsequent to the Price River MFP. In the past, BLM has primarily managed for five of the six ROS classes, including primitive, semi-primitive non-motorized (SPNM), semi-primitive motorized (SPM), roaded natural, and rural. The urban ROS classification does not typically require BLM management, but BLM can coordinate with cities and towns to provide recreation opportunities using ROS. Roaded natural and rural ROS classes also require very little BLM management. The primitive, semi-primitive, and roaded natural classifications are designed to provide certain types of recreation experiences and settings and may require management to meet experiences, opportunities, and settings (Table 3-27 and Map 3-16—Overall Field Office ROS Inventory).

Table 3-27. Recreation Opportunity Spectrum within the PFO

ROS Classes	Acreage
Primitive	418,551
Semi-primitive Nonmotorized	504,138
Semi-primitive Motorized	1,951,745
Roaded Natural	691,969
Rural	168,281
Urban	15,363

3.3.3.2 Recreation Management Areas

Recreation Management Areas (RMA) are the primary means used by BLM to manage recreational use of the public lands. All public lands managed by BLM fall within either an Special Recreation Management Area (SRMA) or Extensive Recreation Management Area (ERMA).

Special Recreation Management Areas

Special Recreation Management Areas (SRMA)s are areas that require a recreation investment, where more intensive recreation management is needed, and where recreation is a principal management objective. Existing SRMAs include the Desolation Canyon, CLDQ, Labyrinth Canyon, and San Rafael Swell. These areas are managed as SRMAs in recognition of high levels of recreation activity and the valuable nature of resources in the area.

Desolation Canyon SRMA (241,682 Acres). Recreation in Desolation and Gray Canyons of the Green River is a unique feature in the PFO. The river corridor between Sand Wash Ranger Station and Swaseys Rapid has been adjudicated as being non-navigable and is subject to BLM management. River use in Desolation Canyon is available by special recreation permit (SRP) only. Fees are charged for all SRPs in

Desolation Canyon. The Canyon receives high levels of primitive recreation use from early spring to late fall. Six private and commercial river launches of up to 25 people per launch are permitted every day of the high-use season (May 15 to August 15). Total user day capacity for the area is 35,000 user days per season. Allocation of private and commercial user days is split 50–50 with unclaimed user days reallocated to a passenger day pool to meet demand. Launches are allocated and held at two per day during the low-use season.

River-related resources in the canyon are generally protected by management prescriptions detailed in the Desolation and Gray Canyons of the Green River—River Management Plan. Intensive use of some camp and day use areas contributes to limited revegetation. However, these impacts are minimized through ranger contact and river permit stipulations and information. River permits are limited during the high-use season for resource protection.

Cleveland-Lloyd Dinosaur Quarry SRMA (765 Acres). In addition to being a world-renowned paleontological resource, CLDQ provides a unique recreation experience. For CLDQ visitors, there is a limited infrastructure to support recreation and educational site visits. CLDQ has a visitor's center featuring interpretive materials and exhibits, as well as information about the San Rafael Swell area. There are two outbuildings at the quarry provide protection for and access to the exposed bone bed. CLDQ features a short interpretive trail, and dispersed hiking. CLDQ is a fee area and is open only during scheduled days and times.

Labyrinth Canyon SRMA (45,862 Acres). Labyrinth Canyon is an excellent example of a large-volume desert river that is easily accessible to floaters. Labyrinth Canyon is federally adjudicated as navigable water. Lands below the 1897 high water line are state owned. The flat water of Labyrinth Canyon attracts a large number of recreationists seeking a scenic river float. As with Desolation Canyon and other similar desert river corridors, impacts occur from concentrated use along the river. Impacts are primarily from concentrated use in camping areas. Resource damage may also occur because a greater percentage of river runners in Labyrinth Canyon are novice and first-time river runners. Permits and BLM patrols of Labyrinth Canyon help minimize these impacts, but some resource damage does occur.

San Rafael Swell SRMA (966,004 Acres). Visitation to the San Rafael Swell is increasing as recreationists seek “undiscovered” areas to explore. Recent publicity surrounding the resources found in the swell serves to increase visitation even more. Certain areas of the swell, such as Little Wild Horse Canyon, the Wedge Overlook, Buckhorn Panel, and the Temple Mountain area are used heavily during peak seasons. In some instances, existing facilities are insufficient to protect resources or support visitor opportunities. The remote nature of the Swell lends itself to many forms of dispersed recreation. The ruggedness, remoteness, and lack of facilities require visitors to be self-sufficient.

Extensive Recreation Management Areas

The Extensive Recreation Management Area (ERMA) is the remainder of the PFO outside of SRMAs and other special designation areas. The ERMA consists of areas where recreation is nonspecialized and dispersed, and does not require intensive management. Attention to recreation may not be the primary management objective in these areas, and recreation activities are subject to few restrictions. The PFO ERMA is managed according to the prescriptions of the Price River MFP and the San Rafael RMP.

The ERMA is used for various types of recreation, including scenic drives, dispersed camping, OHV use, hiking, fishing, and cultural resource viewing. Although the primary management objective of the ERMA is not necessarily recreation, the large number of attractive recreation sites and areas make action toward management an important consideration. Recreation, along with other uses of the area such as grazing and mineral development, has exposed an important issue. Many uses of the ERMA have

developed or changed since the implementation of the Price River MFP and San Rafael RMP. Most of the northern portion of the PFO was classified as open for OHV use, owing to limited OHV use when the Price River MFP was prepared. OHV use has changed dramatically since that time.

3.3.3.3 Special Recreation Permitting

Special Recreation Permits (SRP) are used to manage different types of recreation associated with commercial uses, competitive events, organized groups, vending, and special areas. These recreation uses can include, for example, uses such as large group events, river guide services, and commercial recreation activities. Each permit is issued based on need and type of use, with appropriate use stipulations intended to enhance the recreation experience and minimize or mitigate resource damage. NEPA review is required for the issuance of special recreation permits.

3.3.3.4 Recreation Visitation

BLM recreation visitation, shown in Table 3-28, is estimated by the Recreation Management Information System (RMIS). RMIS estimates recreation participation in 65 types of recreation activities recorded at BLM sites and areas, based on registrations, permit records, observations, and professional judgment. Visitation is estimated by numbers of visits as well as visitor days. Visits represent the actual number of people who take part in a recreation activity. A visitor day is a common unit used to measure recreation use on federal lands. One visitor day represents an aggregate of 12 visitor hours to a site or area.

Table 3-28. Recreation Visitation

Years	Participants	Visitor Days
1999	1,564,584	1,582,294
2000	1,427,989	1,474,109
2001	617,071	641,289

Note: Changes to the RMIS system method of data collection and estimation were made after fiscal year (FY) 2000. Recreation estimates before FY 2001 were believed to be overestimates, so the methodology for FY 2001 was improved and visitation estimates were significantly lower for the PFO in 2001. Large declines in visitation estimates from 2000 to 2001 should not be interpreted as an actual decrease in visits, but rather a change in estimation methodology.

Source: BLM Recreation Management Information System, BLM Utah State Office.

OHV use is perceived as the fastest growing activity in the PFO, but visitation data on recreation use can be particularly difficult to collect because of the dispersed nature of many activities. Improved information on the actual amount and the areas of recreation use would improve management and decrease potential for visitor conflict. The existing system of recreation visit data collection, RMIS, does not adequately describe the types or amounts of recreation use occurring in the PFO area. The primary difficulty with the RMIS data collection system is the lack of actual data collection in most parts of the PFO.

Recreation Facilities and Visitor Contact

Direction for the use of sites and areas comes largely from the design of facilities, regulations posted in the area, and visitor contact by with a BLM employee or Emery County sheriff. Recreation facilities and visitor contact are the primary tools used to manage recreation activities on public lands. In many cases, the only information a visitor receives during his or her stay is from interpretive or administrative signage or maps and brochures.

Developed recreation sites incorporate visitor use infrastructure, defined in the *Utah Standards for Public Land Health and Guidelines for Recreation Management* as amenities such as roads, parking areas, and

facilities, to protect the resource and support the recreation user in pursuit of activities, experiences, and benefits. Visitor use infrastructure is a management tool that can help minimize resource impacts, appropriately concentrate use, and reduce visitor conflicts. Developed recreation sites in the PFO help accomplish all of these goals. First priority for facilities development in the PFO is for those developments that protect resources and improve visitor experiences.

3.3.3.5 Recreation Activities

Front country recreation is recreation that occurs along primary travel corridors and at highly developed sites. This type of recreation remains popular in the PFO area. Because visitation to these sites may increase, management of the areas may need to focus more heavily on providing defined recreation experiences. Users of front country recreation sites typically demand more extensive interpretive information and facilities. Dispersed recreation is recreation that occurs off of away from primary travel corridors and away from developed sites. Areas that were once dispersed recreation sites may have become de facto front country recreation sites through increased use.

Float boating is an important recreation activity in the PFO on the Green River. Float boating is an intermittent recreation use subject to adequate flows on the Muddy, Price and San Rafael Rivers, which would be managed as a dispersed recreation activity.

Visitor experiences from activities such as OHV use, backcountry camping, mountain biking, rock climbing, river running, and hiking are dependent on a low density of other visitors.

3.3.3.6 Recreational Off-Highway Vehicle Use

Growth of OHV use has become a significant issue in the PFO because of the concern related to the possible degradation of resources that can result from high levels of use and proliferation of pioneered routes. OHV registrations in Utah have grown significantly over the past 10 years. Registrations in Carbon and Emery counties also have grown increased as well. Statewide OHV registrations are shown in Table 3-29. OHV use and management should be addressed and updated with an effort to resolve resource conflicts that pertain to other natural resources and still provide for responsible OHV use.

Table 3-29. Total OHV Registration, by Year

	1999	2000	2001	2002	2003
Price Department of Motor Vehicles (Carbon County)	2,142	2,399	2,461	*	2,948
Emery Department of Motor Vehicles (Emery County)	1,051	1,201	1,240	*	1,935
Utah State Total	79,666	90,611	86,015	110,435	150,789

Source: Utah State Tax Commission, OHV Registration.

* Figures unavailable at time of publication.

PFO Rams and current OHV designations are shown in Table 3-30. The level of OHV use within SRMAs and the ERMA is an important component of these designations. Existing OHV use categories were designed to accommodate relatively low levels of OHV use and conflict encountered when existing plans were implemented.

Recreation activities can conflict and affect the opportunities and experiences available. Recreation activities may also conflict with and have an impact on other uses of the PFO. Specific examples of this type of conflict and impact include damage to cultural resources, disturbance of wildlife habitat, disruption of grazing activities, and damage to natural ecosystems.

Table 3-30. RMAs and OHV Designations, in Acres

Area	Type	Total	OHV Open	OHV Closed	Limited
Cleveland-Lloyd Dinosaur Quarry	SRMA	80	0	80	0
Desolation Canyon	SRMA	107,520	0	0	107,520
Labyrinth Canyon	SRMA	40,965	5,096	18,121	17,748
San Rafael Swell	SRMA	1,558,203	0	116,689	1,441,514
Price River area	ERMA	920,201	583,279	533	436,371
San Rafael area	ERMA	485,088	187,898	218	296,973

3.3.4 Lands and Realty

The primary objective of the lands program is to facilitate the use of public lands through rights-of-way (ROW), leases, and permits. The secondary objective is to provide support to other programs that protect and enhance resources. The goal of these two objectives is to create a balance between land use and resource protection that serves the public at large.

Lands are currently managed under classifications, withdrawals, ROWs, short-term land permits, leases and disposal actions. ROWs across public lands are granted under Title V of FLPMA and Title I of the Mineral Leasing Act (43 CFR 2800 and 2880). ROWs are issued for many purposes and are recorded on master plats, which are located at the PFO and the BLM Utah State Office.

Approximately 61 percent of Carbon County and 92 percent of Emery County is public land. A lands action can take place anywhere in the PFO as long as it meets those restrictions and conditions required by law, regulation, or management of other resource values.

Land tenure adjustments focus on acquiring private in-holdings that have high resource values. The direction is to seek acquisition of easements on state or private land that provide legal access to public land. BLM may acquire private land by donation, direct purchase, or exchange for federally owned land of approximately equal value in the same state.

3.3.4.1 Land Disposal

Public lands in the field office may be disposed if—

- The lands meet disposal criteria as outlined in Section 203 and 206 of FLPMA.
- Sale or exchange of the land is not precluded by federal mandate, such as the Endangered Species Act (ESA) or the National Historic Preservation Act.
- The land is not more suitable for other resource management and development, such as wilderness, grazing, and recreation, as identified in the LUP.

Under BLM policy, plans may identify lands as suitable for disposal only when the disposal criteria for the proposed disposal action (i.e., land exchange, state indemnity action, agricultural entry, or Recreation and Public Purposes Act [R&PP] conveyance) are met. Isolated tracts are usually identified during the planning process. Unless lands are identified for disposal in the RMP, they cannot be disposed of by direct sale.

3.3.4.2 Right-of-Way

Major ROW utility corridors on public lands are required to be consistent with the goals, standards, and objectives for natural resources within the PFO. In addition, new ROW corridors for interstate and intrastate ROW facilities are required to meet current and 10- to 15-year demand forecasts for ROW commodities (e.g., such as pipelines, wind energy, communication facilities, off-lease coal facilities, electric power transmission and distribution lines, county road system changes, access to private land, telephone and waters systems). ROW use areas are identified for broader non-linear areas to accommodate ROW facilities within high-intensity use areas (e.g., such as mineral development areas, rapidly expanding community growth areas, mountain-top communication site locations, and potential wind energy resource development areas). ROW corridors and ROW use areas are preferred locations for the siting of ROW facilities as explained in BLM Manual 2801.11 and 2801.12. BLM management will identify, as necessary and appropriate to particular alternatives, ROW avoidance and exclusion areas for areas with special or sensitive resources (e.g., proposed ACECs or WSAs).

3.3.4.3 Exchanges/Acquisitions

Disposals through Exchange

Public lands would be considered for disposal by exchange provided:

- The exchange would result in more efficient federal management of the public lands.
- That the values and management objectives which the federal lands and interests to be conveyed may serve, if retained in federal ownership, are not more than the values of the non-federal lands or interests and the public objectives they could serve if acquired by the United States.
- The land exchange is based on fair market value determined for the federal and non-federal lands as defined in Uniform Appraisal Standards for Federal Acquisitions and by current BLM policy.

Acquisitions through Exchange

Non-federal lands would be considered for acquisition through exchange of suitable public land, on a case-by-case basis, whereas acquisition of the non-federal lands would contain resource values equal to or greater than the public lands being exchanged.

Non-federal lands to be acquired through both Bureau- and public-initiated exchanges must have at least one of the following characteristics:

- Acquisition would facilitate access to public lands and resources and/or contribute to a more efficient and manageable land ownership pattern.
- Acquisition would facilitate implementation of the RMP management actions.
- Acquisition of the non-federal lands would maintain or enhance public uses and values with priority given to acquiring riparian/wetlands, lands with high recreation use and/or wildlife values, sensitive plant or animal habitat and lands with significant cultural sites, and/or paleontological localities or within other special designations.
- Acquisitions that would meet other conditions pursuant to FLPMA Section 206 or 43 CFR 2200.
- Acquired lands would be managed in accordance with the management objectives identified for adjacent lands unless resource considerations require a plan amendment.

Other Methods of Acquisition

In addition to acquiring non-federal lands through land exchanges, PFO could acquire lands by direct purchase utilizing using programs such as the Land and Water Conservation Fund (LWCF), when funding is available, donation, or legal settlement. Such land would be vested in the United States in perpetuity unless otherwise directed by Bureau policy or Congressional mandate.

3.3.5 Minerals and Energy Development

As a part of this planning process, a Mineral Potential Report was developed. This report examines in detail, the geologic features and mineral presence and development potential throughout the field office. This report was used in development of management alternatives, as well as in analysis. Specific information regarding mineral resources and development potential is identified in the report. Listed below is only a summary of some of the information found in the Mineral Potential Report.

The categorization of mineral resources as “locatable,” “leasable,” or “salable” is based on the provisions of the Mining Law of 1872, and other laws. This Act declared, “all valuable mineral deposits in lands belonging to the United States...to be free and open to exploration and purchase.”

BLM is the main federal administering agency for oil and gas, minerals (locatable, leasable, and mineral materials) and coal development in the planning area. Table 3-31 lists the acreage held under current oil and gas leases, current coal leases, and active mining claims (locatable minerals) on federal land in the planning area.

Table 3-31. Land Held for Mineral and Energy Resources in the PFO, by County

Resource	Carbon County	Emery County	Total
Oil and Gas Leases	238,053 acres	251,072 acres	489,125 acres
Coal Leases	318,681 acres	354,708 acres	673,389 acres
Mining Claims	11,000 acres (approx.)	21,000 acres (estimated)	32,000 acres

Source: USGS, 2002a

Note: Information current as of September 30, 1999.

In terms of future development potential, the most important mineral resources in the planning area are coal, CBNG, and oil and gas (leasable minerals), gypsum (locatable mineral), clay, sand and gravel, and humate (mineral materials). Overall, coal and CBNG resources have the highest potential for future development. More detailed information is provided in the Mineral Potential Report (2002), which was prepared in conjunction with this RMP. It is also understood that demand for mineral energy resources (oil, gas, CBNG, and coal) will continue at current levels or increase through the life of the plan. In addition, advancing technologies in alternative energy resources, including solar and wind potential, will continue.

3.3.5.1 Locatable

Locatables are mineral deposits such as precious and base metals, gypsum, and clay.

Gypsum. Areas of both high and moderate gypsum occur in the PFO (Map 3-17). It is considered likely that the areas with high occurrence potential will be developed in the next 15 years, although it is unlikely that areas of moderate potential will be developed.

Clay. Areas of high, moderate, and low clay occurrence were identified in the PFO (Map 3-18). With the exception of areas that are currently being mined, it is considered unlikely that clay deposits will be developed in the next 15 years. It is anticipated that areas undergoing active clay mining will continue to be developed over the next 15 years.

3.3.5.2 Leasable

Leasable, energy-related minerals are oil and gas (which includes CBNG), and solid hydrocarbons. Mineral leasing categories have been assigned for the PFO, shown in Table 3-32.

Table 3-32. Mineral Leasing Categories within the PFO

Mineral Leasing Categories	Acres
Open Subject to Standard Lease Form Stipulations	958,015
Open With Special Stipulations	894,399
Open With No Surface Occupancy	86,000
Closed to Leasing	540,786

Coal bed Natural Gas

Areas of high, moderate, low, and no CBNG occurrence potential were identified in the PFO (Map 3-19). Areas of high occurrence potential were associated with a high degree of certainty, whereas areas of moderate and low occurrence potential had a medium or low degree of certainty. In areas with a high mineral potential, it is considered likely that CBNG development will occur in the next 15 years. In all remaining portions of the planning area, CBNG development in the next 15 years is unlikely.

Oil and Gas

Areas of high and low conventional oil and gas occurrence potential were identified (Map 3-20), each associated with a moderate level of certainty. Map 3-21 shows occurrence potential for oil shale, and Map 3-22 shows currently held federal oil and gas leases. In areas of high potential, it is considered likely that oil and gas resources will be developed over the next 15 years. It is unlikely that any areas with low oil and gas occurrence potential will be developed in the next 15 years.

Coal

As a part of this planning process, a Coal Report was completed by BLM in cooperation with the State of Utah. This report has been included as Appendix 27. This report provides detailed information regarding the coal resources managed by the Price Field Office, which includes coal resources in Carbon and Emery counties as well as portions of Sevier County.

The Price Field Office manages significant coal deposits (in Carbon, Emery and Sevier counties) that together account for about one-third of Utah's coal resources and 90 percent of its current production (see Map 3-23).

Carbon and Emery counties contain significant coal deposits that account for about 20 per cent of Utah's total coal resources. All or parts of three coal fields are inside the planning area, the Book Cliffs, the Wasatch Plateau, and the Emery coal fields. Some of the Emery Coal Field is in Sevier County outside the planning area, and much of the Wasatch Plateau Coal Field is located in the Manti-LaSal and Fishlake National Forests managed by the U. S. Forest Service. Lands outside the planning area were not considered in this plan for future leasing. Lands inside the planning area but located in National Forest System lands were considered for future leasing and development but did not have unsuitability criteria

applied because as that is a function of the National Forest System's land use planning. The Manti-LaSal National Forest is currently updating and /revising a forest land use plan that was completed in 1986 where unsuitability was completed. Future leasing within the two National Forests is a joint effort with the BLM and the Forest Service. Management of existing leases in all of the three coal fields, whether outside the planning area or in National Forest lands, are handled by the BLM (Price Field Office and Utah State Office).

Federal coal areas with potential for future coal development are shown on map 3-24. Those areas acceptable for further consideration for leasing are listed below.

Book Cliffs Coal Field—The Known Recoverable Coal Resource Area (KRCRA) defined for the Book Cliffs coal field comprises 129,338 acres is in the planning area. Development of this coal field has been ongoing for the last century. An estimated 275.2 million tons of coal remain to be recovered in the area. Approximately 62 percent of the remaining recoverable reserves of this coal field are currently held under lease, whether federal, state or private. Much of the Book Cliffs Coal Field would be considered as split-estate lands with the surface owned by private landowners and the coal estate reserved to the United States. Based on coal resource data, a number of areas (Map 3-24) , have been identified within the KRCRA that could potentially be developed over the next 30 years. This area with development potential includes about 7,180 acres of unleased federal coal. The Coal Unsuitability Criteria outlined in 43 CFR 3461.5 have been applied to these lands. Generally, for most of the criteria, an exception can be applied because the lands will be mined by underground mining methods and should not adversely affect the resource values identified in the criteria. One area with development potential is contained within the Turtle Canyon WSA and would be considered unsuitable for leasing under the interim management policy until Congress takes final action on these lands.

Wasatch Plateau Coal Field—The Wasatch Plateau KRCRA comprises more than over 350,000 acres in Carbon, Emery, Sanpete, and Sevier counties. Of this total, 210,000 acres (60 percent) is within the planning area. Development of this coal field has been ongoing for the last century. An estimated 686 million tons of recoverable coal that remain in the planning area that are considered to have development potential over the next 30 years. Of this total, 203.4 million tons are currently now under lease. The northeast portion of the coal field contains many split-estate lands with private surface and the coal reserved to the federal government. The remainder of the coal field to the south is National Forest lands with some associated fringe public lands. The BLM has identified about 5,130 acres of unleased federal coal, with surface managed by the BLM and 8,300 acres of unleased federal coal, with surface managed by the Forest Service, as areas in the coal field that are likely to be developed in the next 30 years. In addition, 15,430 acres of state coal (with potential revision to federal coal after certain levels of production) have been identified as areas in the coal field having development potential. In this planning effort, the unsuitability criteria were only applied to only the 5,130 acres of land with the surface managed by BLM. The Forest Service is responsible for applying the coal unsuitability criteria for National Forest Lands in their land use plans. The coal in the Wasatch Plateau will be primarily mined through underground mining methods, so an exception can be applied for most of the criteria because stipulated mining method should not adversely affect the resource values identified in the criteria. A small (120 acres) of split estate lands (federal coal and private surface) has surface mining potential. No criteria have been identified that would determine these lands to be unsuitable for leasing. Prior to moving forward with leasing for this parcel, consent must be obtained from the surface owner. All of the lands in the Wasatch Plateau with development potential are considered to be acceptable for further leasing considerations.

Emery Coal Field—The Emery KRCRA comprises about 89,500 acres, approximately 57,200 acres of which (64 percent) occur inside the planning area. Development of this coal field has been sporadic over the last 90 years but with minimal production. In Emery County, the Emery Coal Field contains an

estimated 238.7 million tons of coal, most of which is not leased at the present time. The area considered to have development potential in the Emery Coal Field (Map 3-24) contains an estimated 106 million tons of recoverable coal.

3.3.5.3 Mineral Materials

Mineral materials are earth materials, such as sand and gravel, building stone, and humate.

Sand and Gravel

Areas of both high and low sand and gravel occurrence potential were identified in the PFO associated with a moderate or low level of certainty (Map 3-25). In high potential areas that are located near major paved roadways, it is considered likely that sand and gravel deposits will be developed over the next 15 years.

Building Stone

Areas of high, moderate, and low stone occurrence potential were identified in the PFO (Map 3-26). In areas where stone is currently being quarried, it is anticipated that development will continue over the next 15 years.

Humate

Areas of high, moderate, and no humate occurrence potential were identified in the PFO. A relatively small area with this mineral is located near I-70 and has active humate mines. It is considered likely that development in this area will continue over the next 15 years.

3.4 SPECIAL DESIGNATIONS

3.4.1 Wilderness Study Areas

In 1964, Congress passed the Wilderness Act, establishing a national system of lands for the purpose of preserving a representative sample of ecosystems in a natural condition for benefit of future generations. Until 1976, most of the lands considered for and designated as wilderness were managed by USFS and NPS. With the passage of FLPMA, Congress directed BLM to inventory, study, and recommend which public lands under its administration should be designated Wilderness.

In 1979, BLM began an inventory of 2.5 million acres of public land in the PFO. In 1980, BLM completed that wilderness inventory, finding eleven areas in the PFO, totaling about 530,892 acres that possess wilderness character. In 1991, the Department of the Interior made its recommendation to Congress. Congress has not acted on that recommendation.

Wilderness and WSAs are roadless and natural, provide outstanding opportunities for solitude or primitive and unconfined recreation, and may have supplemental values (e.g., such as ecological, geological, or other features of scientific, educational, scenic, or historical value). With completion of the inventory in 1980, the BLM designated the ten Wilderness Study Areas (WSA) and one Instant Study Area (ISA), as listed in Table 3-33 in the PFO.

Table 3-33. Wilderness Study Areas in the PFO

WSA Name	Acres
Desolation Canyon	229,860
Turtle Canyon	35,279
Jack Canyon	7,735
Muddy Creek	31,139
Sids Mountain	78,718
Devils Canyon	9,111
Crack Canyon	26,640
San Rafael Reef	63,007
Horseshoe Canyon (North)	17,951
Mexican Mountain	58,930
Link Flats ISA	855
Total in the PFO	559,225

The Links Flat Natural Area became an ISA with the passage of FLPMA. The WSAs and ISA total about 559,225 acres. These WSAs and ISA, shown in Map 3-27, were established under the authority of Section 603(c) of FLPMA and are being managed to preserve their wilderness values according to the Interim Management Policy (IMP) for Lands Under Wilderness Review (BLM H-8550-1). They will continue to be managed in that manner until Congress either designates them wilderness or releases them for other uses.

Management of WSAs is similar but generally less restrictive than is management of designated Wilderness. Activities that are allowed in WSAs include hunting, fishing, travel with motorized vehicles on existing routes (unless otherwise restricted through land use planning), camping, hiking, horseback riding, and livestock grazing.

There are six primary provisions of FLPMA with regard to “interim management” of WSAs, as follows:

1. WSAs must be managed in a way that will not impair their suitability for preservation as wilderness.
2. Activities that are permitted in WSAs must be temporary uses that create no new surface disturbance, and not involve permanent placement of structures.
3. Grazing, mining, and mineral leasing uses that existed on October 21, 1976, may continue in the same manner and degree as on that date, even if this would impair wilderness suitability of the WSAs.
4. WSAs may not be closed to appropriation under the mining laws to preserve their wilderness character.
5. Valid existing rights must be recognized.
6. WSAs must be managed to prevent unnecessary or undue degradation.

Only Congress can designate the WSAs established under Section 603 of FLPMA in 1980 as Wilderness, or release them for other uses. The status of the existing WSAs will not change as a result of the RMP process. A discussion of the current resource values and uses in each WSA can be found in the Utah BLM Statewide Wilderness Study Report (BLM, 1991b).

3.4.2 Areas of Critical Environmental Concern

There are currently 13 ACECs in the PFO (Map 2-42 of Chapter 2). The size of each area and the relevant and important values it is designated to protect are listed in Table 3-34.

Table 3-34. Areas of Critical Environmental Concern

ACEC	Acres	Relevant and Important Values
Big Flat Tops	285	Relict vegetation
Bowknot	1,087	Relict vegetation
Copper Globe	128	Mining
Dry Lake	22,258	Archaeological, geologic
I-70 Scenic	45,594	Scenic
Muddy Creek	28,778	Scenic, mining, riparian
Pictographs	7	Archaeological
San Rafael Canyon	54,102	Scenic
San Rafael Reef	84,018	Scenic, relict vegetation
Seger's Hole	7,918	Scenic
Sid's Mountain	61,380	Scenic
Swasey's Cabin	60	Historic ranching
Temple Mountain	2,444	Mining
TOTAL ACECs	308,059	

Source: Utah BLM.

Many areas in the PFO have been identified as having the required characteristics for ACEC designation, including . These areas include significant and sensitive examples of prehistoric and historic artifacts. Areas to be considered for ACEC designation are subject to increased impacts from other resource uses, such as recreation, mineral development, and grazing as use of the area has increased.

3.4.3 Wild and Scenic Rivers

The National Wild and Scenic Rivers System (NWSRS) was created by Wild and Scenic Rivers Act of 1968. The purpose of the act was to preserve in their free-flowing condition, certain selected rivers of the nation, which, with their immediate environments, possess outstandingly remarkable scenic, recreational, geologic, fish and wildlife, historic, cultural, or other similar values.

Section 5(d)(1) of the Act directs federal agencies to consider the potential for national wild, scenic, and recreational river areas in all planning for the use and development of water and related land resources. The wild and scenic river (WSR) review involves three determinations to be made in the planning process for the Price RMP. Eligible rivers are considered further for suitability. Summary information regarding these eligible rivers is identified in Appendix 3.

Rivers can be designated into the national system by an act of Congress or by the Secretary of the Interior at the request of a state governor. A designated river is formally classified wild, scenic, or recreational based on the presence of development and activity within the river's corridor. Classifications serve as a baseline land use description and guide management activities within the corridor. Comprehensive river management plans for WSRs are to be developed within 3 years of designation. The PFO has coordinated a review of stream segments for WSR status with Vernal, Richfield, and Moab BLM field offices, Manti-LaSal National Forest, the State of Utah, Carbon and Emery Counties, and the Ute Tribe.

There are currently no rivers or river segments in the PFO that have been carried through the WSR review process. No WSR considerations were included in the Price River MFP. Portions of the Green River,

Muddy Creek, and San Rafael River were determined to be eligible for inclusion in the national system of rivers in the San Rafael RMP. However, a suitability determination was not completed.

3.4.3.1 BLM Backcountry Byways

BLM Backcountry Byways are components of the National Scenic Byway system. The Scenic Byways program was established by the U.S. Department of Transportation in 1991. Roads may be recognized as scenic byways based on their archaeological, cultural, historic, natural, recreational, and scenic qualities. Designation and management can occur at local, state, or national levels. BLM Backcountry Byways are a system of low-standard roads that pass through public lands with high values in the categories as listed.

The Nine Mile Canyon Scenic Byway is a State Scenic Byway and a BLM Backcountry Byway. It follows the length of Nine Mile Canyon, and loops to the north through Gate Canyon and Duchesne, and returns south on State Highway 6. The total length of the byway is 78 miles. Within Nine Mile Canyon is the greatest concentration of rock art sites in the United States. There are also several historic sites. Two National Scenic Byways (i.e., the Dinosaur Diamond National Scenic Byway and the Huntington and Eccles Canyons Scenic Byways), also traverse through portions of the PFO.

3.4.3.2 National Historic Trails

The Old Spanish Trail National Historic Trail was designated as part of the National Trails System in December 2002. Portions of the Old Spanish Trail exist within the southern part of the PFO. The primary branch of the trail runs through Green River. The NPS and BLM co-manage the National Historic Trail System.

3.4.3.3 Other Special Designations

There are two National Landmarks in PFO: CLDQ National Natural Landmark (NNL) and Desolation Canyon National Historic Landmark (NHL).

CLDQ was designated an NNL after a NPS study concluded that the proximity of Dinosaur National Monument precluded the inclusion of the quarry in the National Park System. The study did state that the quarry would qualify for status as a registered natural landmark (BLM, 1976). In addition to being an NNL, CLDQ is managed as an SRMA.

Desolation Canyon NHL was established in 1969 as part of the centennial of John Wesley Powell's first exploration of the Green and Colorado river systems. The NHL extends from the confluence of Nine Mile Creek to the confluence of Florence Creek, for one mile on either side of the river. Of all the rivers explored by Powell, this segment was judged to be the least changed. It is managed to provide visitors a landscape experience as similar to Powell's that is available today. It commemorates events of 1869, well before the coming of cattle to this river segment. The present cattle grazing is a non-conforming but permitted use of the Landmark. Contained entirely within the Desolation Canyon NHL is the Flat Canyon Archaeological District.

3.5 SUPPORT

3.5.1 Transportation and Motorized Access

BLM and Carbon and Emery counties maintain roads within the PFO. BLM policy is to develop and maintain roads that provide access for BLM personnel for resource management purposes. Field office personnel identify which roads require maintenance from year to year. These assessments, combined

with the experience as expressed by the BLM operations staff, determine which roads will be maintained and improved.

There are several actively used backcountry airstrips are located within the PFO. Some of these airstrips are maintained by volunteer groups.

Hazardous Materials and Waste

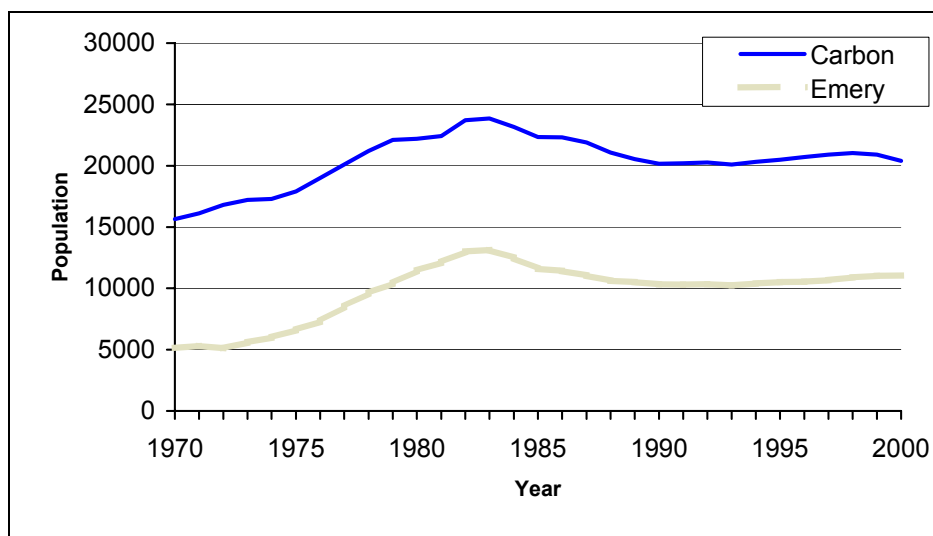
Management of hazardous materials, substances, and waste (including storage, transportation, and spills) will be conducted in compliance with 29 CFR 1910, 49 CFR 100-185, 40 CFR 100-400, Comprehensive Environmental Response Compensation and Liability Act (CERCLA); Resource Conservation and Recovery Act (RCRA); Superfund Amendment Reauthorization Act (SARA); Toxic Substances Control Act (TSCA); Clean Water Act (CWA); and other federal and state regulations and policies regarding hazardous materials management.

3.6 SOCIOECONOMICS

Lands managed by the BLM Price Field Office total approximately 66 percent of Carbon and Emery Counties. The economic base of both counties has historically been tied to public land resources. Industries such as mining, ranching, and recreation are highly dependent on the public lands. The area is predominately rural and has a relatively small number of people. Details of the current socioeconomic conditions of Carbon and Emery Counties can be found in the *Baseline Socioeconomic Profile for the Price RMP*. A summary of the major socioeconomic conditions is found below.

Population

Population in Carbon and Emery Counties peaked in the mid-1980s but has remained relatively stable since that time (Figure 3-1). The population of Carbon and Emery County in 1999 was approximately 32,000 people. Patterns of population change show that net migration has been negative, which indicates that the area may be losing adult population. The racial composition of Carbon and Emery Counties is predominately Caucasian, with small percentages of other races. The ethnic composition of the field office has been influenced by historic influxes of immigrants because of mining and railroad development in the early 20th century.

Figure 3-1. Population Estimates 1970–2000, Economic Study Area

Source: BLM Socioeconomic Profile Price Field Office Resource Management Plan, 2002

Poverty

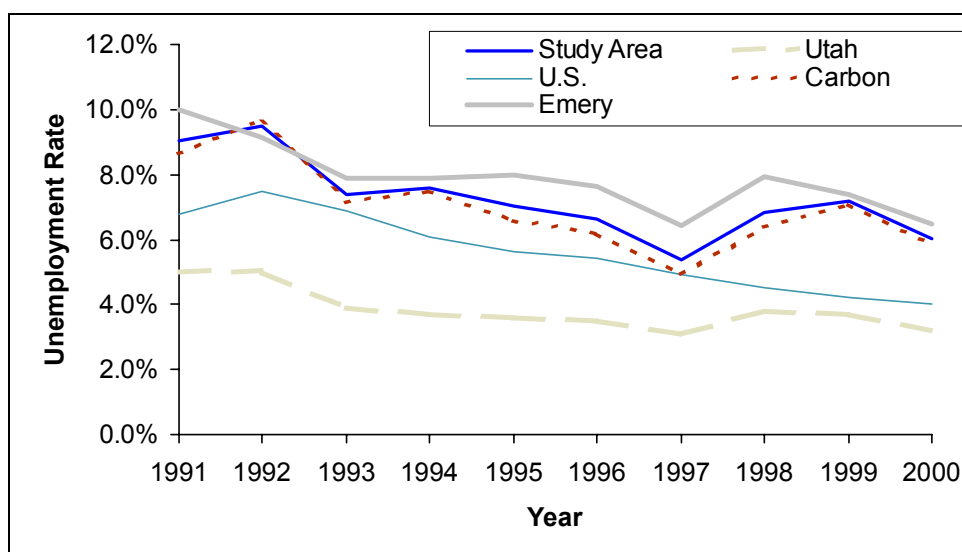
Poverty rates in Carbon and Emery Counties have fluctuated between 10 and 15 percent in the last 10 years. In 1998, poverty rates in both counties were higher than the statewide average, but very near the national average.

Personal Income

Personal income in Carbon and Emery Counties grew by 19 percent between 1989 and 1999. Labor income remains the largest component of personal income but has fallen significantly in the past 20 years. Investment and transfer payment income have become larger components of personal income. Per capita income for the two counties in 1999 was \$19,484, which was below state and national averages.

Economic Characteristics

Although unemployment rates have decreased for Carbon and Emery Counties in the past 10 years, they have been consistently higher than both state and national rates throughout the 1990s. (Figure 3-2). As a whole, the civilian labor force in both counties grew by 3 percent between 1991 and 2000, but Emery County's labor force declined by 4.7 percent.

Figure 3-2. Unemployment, Economic Study Area, 1991–2000

Source: BLM Socioeconomic Profile Price Field Office Resource Management Plan, 2002

Employment and Earnings

Total employment in both counties increased by 11 percent between 1979 and 1999 (Table 3-35). This growth in employment lagged behind state and national averages. Industries in Carbon and Emery Counties that grew fastest during this time were services, trade, and government. Industries with the largest declines were mining and construction.

Table 3-35. Employment and Income by Major Industry, Study Area, 1999

Industrial Sector	Earnings (\$1,000)	Percent of Total	Number of Jobs	Percent of Total
Agriculture services, forestry, fishing, and other	(D)	0.0	(D)	(D)
Mining	\$110,736	17.2	1,830	10.7
Construction	\$31,829	4.9	912	5.3
Manufacturing	\$16,319	2.5	485	2.8
Transportation and public utilities	\$68,869	10.7	1,228	7.2
Wholesale trade	\$16,940	2.6	608	3.6
Retail trade	\$37,419	5.8	2,841	16.6
Finance, insurance, and real estate	\$1,608	0.2	447	2.6
Services	\$85,844	13.3	4,345	25.4
Farm	-\$1,227	-0.2	804	4.7
Federal, state, and local government	\$95,315	14.8	3,243	18.9
Totals	\$644,560	100	17,122	100

Source: U.S. Department of Commerce, Bureau of Economic Analysis, Regional Accounts Data, Table CA05 Personal Income by Major Source and Earnings by Industry, 1979–1999.

(D) Not shown to avoid disclosure of confidential information, but the estimates for this item are included in the totals.

Economic Base Analysis

The economy of Carbon and Emery Counties lacks diversity and is highly dependent on transfer payments (retirement and assistance income) and mining. Between 1979 and 1999, large amounts of

study area income shifted from mining to transfer payments as a result of declining mining income. Other local industries provide relatively small percentages of area income (Table 3-36).

Table 3-36. Estimated Personal Income from Basic Industries or Outside Sources, Study Area

Personal Income by Source (\$1,000)			Percentage of Total Personal Income	
(1)	(2)	(3)	(4)	(5)
	1979	1999	1979	1999
Transfer payments (retirement and assistance)	67,213	125,691	11.6	19.5
Manufacturing	9,363	16,319	1.6	2.
Mining	226,695	110,736	39.2	17.2
Investment income ¹	66,856	94,419	11.6	14.7
Agriculture	800	208	0.1	0.0
Federal and state government	24,001	39,377	4.2	6.1
<i>Total</i>	-	-	<i>68.3</i>	<i>60.1</i>
Total personal income	578,181	643,333	-	-

Source: U.S. Department of Commerce, Bureau of Economic Analysis, Regional Accounts Data, Table CA05 Personal Income by Major Source and Earnings by Industry, 1979–1999.

¹ 30 % of investment income assumed from outside sources.

Property Valuation and Taxation

Mineral production remains a major source of tax revenue for area governments. Oil, gas, and coal extraction provided nearly 18 percent of local government revenue during 2000.

Specific Resource Activities

Mineral extraction, grazing, and recreation are three of the largest public-lands-related economic sectors in Carbon and Emery counties. Mineral extraction remains the area's largest sector with approximately roughly \$650 million of mineral production during 2000. Grazing on public lands produces approximately about \$1 million of production value in the area. Recreation expenditures associated with activities on public lands managed by BLM in the two counties are estimated at \$16 million.

Economic Justice

The ethnic composition and economic situation of residents of Carbon and Emery Counties indicates that there are no minority or low-income populations are experiencing disproportionately high or adverse effects from current management actions.